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Vol. 13, No. 10

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- 1. Ansbacher, S., and Fernholz, E., Am. Chem. Soc., 61:1924 (1939).
- 2. Thayer, S. A., et al., ibid., 61:2563 (1939).
- 3. Tishler, M., and Sampson, W. L., ibid., 61:2564 (1939).
- 4. Almquist, H. J., and Klose, A. A., ibid., 61:2557 (1939).
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- 6. Almquist H. J., and Klose, A. A., J. Biol. Chem., 130:787 (1939).

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103. ALEXANDER, GORDON. The principle of the relative optimum necology. Jour. Colorado-Wyoming Acad. Sci. 2(4): 29. 1938.—The concept of absolute optimum, while valuable in studies of a single variable, does not simplify our analysis of biotic and physical environmental factors in nature. With many simultaneous variables, the optimum condition of a given factor is relative to the other factors present. Recognition of the principle of the "relative optimum" should simplify analysis of community integration.—G. Alexander.

104. BAY, JAMES WILLIAM. Glacial history of the streams of southeastern Michigan. Cranbrook Inst. Sci. [Bloomfield Hills, Michigan] Bull. 12. 1-68. Folding map, 3 pl., 11 fig. 1938.

105. BENNETT, H. H. Emergency and permanent con-

[Bloomfield Hills, Michigan] Bull. 12. 1-68. Folding map, 3 pl., 11 fig. 1938.

105. BENNETT, H. H. Emergency and permanent control of wind erosion in the Great Plains. Sci. Month. 47 (5): 381-399. Illus. 1938.

106. COSTER, I. C. Bovengrondsche afstrooming en erosie op Java. [Surface run-off and erosion in Java.] [With Eng. summ.] Landbouw 14(8/9): 457-572. Illus. 1938.

107. FROHNE, W. CARRINGTON. Contribution to knowledge of the limnological rôle of the higher aquatic plants. Trans. Amer. Microsc. Soc. 57(3): 256-268. 1938.—Six species of aquatic sedges and a reed commonly thought to support few or no insect feeders, were found to possess a fauna of 50 spp. in the region of Douglas Lake, in northern Michigan. 94% of the insects belong to the orders Coleoptera, Lepidoptera, Dipters, and Hymenoptera. Nearly half are phytophagous, the remainder include parasites and scavengers. The injuries caused by the insects are largely the result of severance of the vascular tissue in stems and leaves by the construction of mines, galleries, gallery-mines and the abnormal cell growth in galls. Aquatic adaptation is illustrated only to a slight degree in the reed-rush insects. Hibernation in the larval stage within the food plant is common.—L. R. Wilson.

108. HOPKINS, J. W. Agricultural meteorology: correlation of monthly precipitation in central and southern Alberta and Saskatchewan with latitude, longitude and altitude. Canadian Jour. Res. Sec. C. Bot. Sci. 16(5): 214-224. 1938.—The linear partial regression coefficients of the 19-year average (1917-1935) monthly precipitation recorded at 42 points in central and southern Alberta on latitude, longitude and altitude were detd. for each month of the year. The correlation of precipitation with these co-ordinates, although statistically significant, was only moderate. Some improvement was effected by inclusion of the quadratic term in longitude, but even so, more than 50% of the inter-station variance of the few of the f

ratic term in longitude, but even so, more than 50% of the inter-station variance of the 19-year precipitation averages for most months remained in the form of residual deviations. Observations for individual years were even less amenable to graduation. Consequently, a given number of meteorological stations would provide a much less complete specification of precipitation than of air temp. (the subject of a parallel previous study) within the area considered.—

109. MONSON, O. W. Need for research in the field of hydrology. Northwest Sci. 12(2): 26-31. 3 fig. 1938.—This is a brief review of past schlevements with suggested lines for future research in the field of hydrology in its broader sense, including hydrography, hydrognosy, hydrogeology, and hydrometeorology—F. V. Rand.

110. THOMAS, H. A. The determination of the meteoro-

logical conditions of the atmosphere by the use of radiosounding balloons. Proc. Roy. Soc. [London] Ser. A. 167 (929): 227-250. 11 fig. 1938.—Previous methods of atmospheric exploration by radio-sounding balloons are reviewed. Arrangements involving radio frequency variations are unlikely to be satisfactory due to the wide frequency band required and the possibility of appreciable interference. In the original method described, a signal of fixed radio frequency is employed, and each meteorological instrument produces a continuous variation of modulation frequency. The pressure- and temp-measuring instruments are arrange to produce variation of modulation frequency without mechanical linkages. The cost of the apparatus is said to be comparatively low, and reproduction in large quantities possible. The results from a number of exptl. ascents are analyzed as showing great reliability and accuracy. Observation of pressure and temperature up to ±10 km. altitude is obtained, the accuracy of these determinations being is obtained, the accuracy of these determinations being ± 5 mb. and 1° C, respectively—F. V. Rand (courtesy Exp. Sta. Rec.).

ANIMAL

111. BLAIR, W. FRANK. Ecological relationships of the mammals of the Bird Creek region, Northeastern Oklahoma. Amer. Midl. Nat. 20(3): 473-526. 12 fig. 1938.—The Bird Creek region of NE Oklahoma is intermediate in position and climate between the eastern deciduous forest and the Great Plains grasslands, and is, therefore, part of an area that is neither predominantly grassland nor forest. The communities of the region are related in part to those of the east in the eastern deciduous forest and tall-grass prairies, and in part to those of the west in the Great Plains grasslands. The local distribution of the grammunities Plains grasslands. The local distribution of the communities is controlled by edaphic factors, and periods of drought aid in restricting the extent of forest associations. Of the aid in restricting the extent of forest associations. Of the 31 spp. of mammals known from the region, 6 range over most of N. America; 3 are widely distributed in western N. America; 12 have the eastern deciduous forest as their area of greatest abundance, 4 the Great Plains grasslands, 3 the Gulf Coastal plain, one the tall-grass prairies, one boreal N. America, and one the desert mountain ranges of the southwestern U. S. As a rule the spp. of mammals occupy in the Bird Creek region communities similar to those they occupy in their respective areas of greatest abundance, but some occur outside of their own association types. These latter also extend beyond the geographic limits of their own association types, and in so doing tend to be modified into different races—W. F. Blair.

112. BODENHEIMER, F. S. Problems of animal ecology. vi+183p. Illus. Oxford University Press: New York, 1938. Pr. \$4.—Chapter I—Physiological and ecological life-tables and connected problems—deals with life-intensity and age structure of animal populations and the relation between ecological ages. II—The life-history and its ecological interpretation today—summarizes data on the physical ecology.

terpretation today—summarizes data on the physical ecology of the life cycle; life cycles of coccinellid beetles in Palestine; applications of the climograph; "bonitation" in the Mediterranean fruit fly; sense ecology and behavior. III—What really occurs in the Drosophila bottle?—presents a further approach to a complete population analysis, with new data concerning the population growth of a Palestinian species of *Drosophila*. IV—Biological equilibrium in nature and biological control—is concerned with a discussion of the relative importance of biotic as contrasted with climatic control. V—Is the community a dynamic or a static con-

ception?—is a discussion in which the author favors the 2d alternative. Chapter VI—The interaction of environment and heredity within the organism—stresses the inadequacy of present genetic theory to explain animal relations in nature and is admittedly a plea for an unprejudiced approach to the problems that find one explanation in the Lamarckian theory...W. C. Allee.

113. MARSHALL, A. J. Bird and animal activity in the

Arctic. Jour. Animal Ecol. 7(2): 248-250. 1938.—Contrary to common opinion some arctic spp., as the arctic tern (Sterna macrura), have periods of quiescence in the perpetual arctic light, although these periods are affected by weather conditions. Other spp., as the fulmar petrel (Ful-

names glacialis), lack these periods and possibly rest only after feeding or when tired.—S. C. Kendeigh.

114. SCHEFFER, THEO. H. Study of a small prairied town. Trans. Kansas Acad. Sci. 40: 391-395, 1937 (1938). An ecological study made in the upper Solomon valley in Kansas, including diagrams of burrows.—F. C. Gates.

PLANT

115. ALBERTSON, F. W. Prairie studies in west-central Kansas, Trans. Kansas Acad. Sci. 41: 77-83. 5 fig. 1938.— The prairies of west-central Kansas are usually composed of 3 general types of vegetation. The short-grass (Buchloe-Bouteloud) type constitutes about 30% of the area and is found capping the nearly level uplands. The little bluestem (Andropogon scoparius) type is well distributed over the hillsides and makes up 60% of the prairie. The remaining 10% is composed primarily of big bluestem (A. furcatus) and is found in the lowlands. The average annual rainfall at Hays, Kansas (1868-1937) was 22.67 inches. For the 5-year dry period (1933-1937) it was only 16.2 inches. During the drought, soil moisture was seldom available to plant use below 2 feet in the short grass type and only occasionally in the upper 24 inches, resulting in enormous losses of vegetation. Meter quadrats staked out and charted in the short grass before the drought and every year since indicate short grass before the drought and every year since indicate no great difference in ground cover existed before the drought on ungrazed and grazed prairies but in the fall of 1937 they ranked 23% and 4% respectively. Weedy forbs were also greatly increased as a consequence of overgrazing. Little bluestem and wire grass (Aristida purpurea) are found widely scattered throughout the short grasses during wet cycles, but upon the advent of drought they retreat to the billsides. Even in the ungrazed little bluestem type slong hillsides. Even in the ungrazed little bluestem type along the hillsides tall grama (Bouteloua curtipendula) and big bluestem have gained at the expense of the little bluestem. Grazing only makes the situation worse. Here there is a great increase in the number of species of unpalatable forbs.

Dust blown from cultivated fields probably causes greater damage than overgrazing.—Author.

116. BAUER, JOHANNA. Beiträge zur Physiologie der Ruderalpflanzen. Planta 28(3): 383-428. 8 fig. 1938.—An ecological study of the flora of the city dump of Leipzig-Moeckern. The nitrate content of the site corresponds to that of good coll. The research with the content of the site corresponds to that of good soil. There was not much NH.-N. Nitrates are stored in mature plants in decreasing amounts in the following species: Amarantus reflexus, Chenopodium album, Atriplex nitens. Such high storage of nitrate may also occur in plants of other localities—Impatiens noli tangere, I. parvifiora, Heracleum spondylium. In sand cultures the following species endured high nitrates: Amarantus retroflexus, Atriplex nitens, Hyoscyamus niger; less so Fago-pyrum esculentum. It is suggested that plants thriving on the dump are better able to endure As in the soil, perhaps also an overbalance of Mg during dry spells. The dump plants are also considered preferentially able to put out new roots after the end of a dry spell. A. retroflexus, Ballota

new roots after the end of a dry spell. A retroflexus, Ballota nigra, Hyoscyamus niger and Solanum dulcamara, are not obligate dump dwellers.—B. R. Nebel.

117. BÖCHER, TYGE W. Biological distributional types in the flora of Greenland. A study on the flora and the plant-geography of South Greenland and East Greenland and East Greenland and East Greenland. between Cape Farewell and Scoresby Sound. Meddelelser om Grønland 106(2): 1-340. 2 pl. 1938.—The work contains the flora of an area recently investigated by the 7th Thule Expedition under the leadership of Dr. Knud Rasmussen (1933). The flora comprises 391 vascular plants. An account

is given of 1) their taxonomy, variation, and cytogenetics, 2) geographical distribution outside of Greenland, 3) geogr. distr. in Greenland, 4) occurrence in SE Greenland, 5) ecology, and 6) life-forms. Under (3) more than 100 maps are given of the spp. within Greenland. Some maps showing the total distribution of a few specially interesting species (Polygala serpyllacea, Juncus squarrosus) are added. The distribution of the plants is on the basis of climatic conditions. The climate is discussed and isotherms for January and July, and isohyets, are inserted on a number of maps. The winter isotherms and isohyets show a more northerly course in E. Greenland than in W. Greenland; the summer isotherms lie farthest north in W. Greenland, bending northward towards the interior of the country; some summer isotherms exhibit an oblong-circular course and remain in the interior of the country right at the edge of the inland ice (e.g., the 10° July-isotherm). The many maps show plants whose northern limits occur farthest north in E. Greenland (southern-oceanic); and plants whose northern limits occur farthest north in W. Greenland towards the interior of the country (southern-thermophilous plants). Some spp. spread inland at their southern limit and extend farthest south in W. Greenland (northern-continental), while others extend farthest south in E. Greenland and seem to prefer the cold outer coast (northern-psychrophilous). Other types of distribution are also found. The flora is thus divided into a number of biological distributional types mentioned above. The extent to which other conditions may have determined the present limits of the spp. is discussed. Where historical and edaphic conditions seem to be the most important causes of the distribution of the plants, the biological distributional type of the particular plant cannot be further elucidated. The biological types of distribution are used to illustrate various phytogeographical conditions. The greater number of eastern spp. are oceanic, while the majority of western spp. are continental or thermophilous. The distributional types are further used, like Raunkiaer's life-forms, in a characterization and classification of plant communities, for which purpose they are regarded as well suited. The phytogeography is treated in a special chapter. The area is divided into zones and subzones on the basis of the floristic results (areal limits, frequency limits) and the distribution of the plant communities. A subarctic, a low-arctic, and a high-arctic zone occurred, each with certain subzones. The close conformity between this division of E. Greenland and Trapnell's division of W. Greenland rendered it possible to prepare a preliminary survey of the phytogeographic zones of Greenland. The number and frequency of the eastern and western spp. are discussed, and also the problem of time of immigration of the flora and the survival of the flora during the ice-ages, especially during the latest ice-age. The author's views may be summarized as follows: In S. and E. Greenland there is a large eastern flora element, which in certain regions plays a greater rôle in the vegetation than the western element. These regions seem to belong to the European flora region, because of a climatic agreement between northwestern Europe and these parts of Greenland. Nearly 100% of the Greenland flora may be supposed to have survived the latest ice-age in Greenland. According to Wegener's theory it may be supposed that during the latest interglacial period (and before) considerable exchange of species took place between N. America and Europe. That even the subarctic spp. may have survived the latest glaciation in Greenland is supported by observations of the flora in relict localities in E. Greenland and by the present natural conditions of SE Greenland, which in many

places have a glacial character.—T. W. Böcher.

118. DAVIES, WILLIAM. Vegetation of grass verges and other excessively trodden habitats. Jour. Ecol. 26(1): 38-49. 1938.—These habitats have a good deal in common as measured by the zonation of the vegetation found associated with them. Under lowland conditions in Britain Lolium perenne, Trifolium repens and Poa annua appear to be the most abundant spp. found on the more heavily trodden part of the road verge or pathway. Under conditions of lower soil fertility, such as those normally associated with heather and other moorland vegetation, the most abundant constituents of the road verge habitat are Agrostis tenuis, Poa annua and the fine-leaved fescues.—Auth. summ.

119. DUTRO, RUTH, and EDITH COHOE. An ecological study of Wolf's Bog, Cheboygan County, Michigan. Trans. Kansas Acad. Sci. 41: 87-95. Map, 4 fig. 1938.—A discussion of the ecological status of this bog developed in a kettle-hole depression of the late Wisconsin glaciation. Due to fire and erosive activities, the lake has been completely exterminated by vegetation and the vegetation itself is beginning to pass from typical bog associations to upland associations.—F. C. Gates.

120. FREDRICKSEN, MORTON T. Comparison of the environment and certain physiological activities of alfalfa and prairie vegetation. Amer. Midl. Nat. 20(3): 641-681. 7 fig. 1938.—A comparison of the environment, growth and water loss in upland prairie and an adjacent field of alfalfa was made at Lincoln, Nebraska, during the growing seasons of 1935 and 1936. Soil moisture reserves were almost exhausted at the beginning of the exp.; precipitation was 3 inches below the normal 28 inches the 1st year and 14 inches below the 2d. Available soil moisture was greater in the prairie at all depths during both years. Average day air temps, were nearly identical in the 2 habitats, but average maximum day temps. were slightly higher in the prairie. Average day soil temps, were consistently higher in the alfalfa field. During periods of extreme heat, vapor pressure deficits were 2 to 32 mm. greater among the rolled and folded foliage of drought-resisting prairie grasses than among the more deeply rooted and more mesic cultivated legumes. Wind movement was greater in the field, and evaporation was markedly greater both among the plants and above them. A new type of phytometer containing native sod was devised for the study of water usage by grasses. They were 2.5 feet deep and had a surface area of one-half square foot. Allowing both transpiration and surface soil evaporation, and being surrounded entirely by undisturbed native vegetation, they permitted determination of actual water usage. Phytometers of alfalfa were likewise completely surrounded by field plants of alfalfa. The average daily water loss per square foot of soil was 89 pound in prairie and 1.35 lbs. in the field during 1935, and 1.15 and 2.17 lbs. in the same sequence during 1935, and 1.15 and 2.17 lbs. in the same sequence during 1936. Water usage per gram of dry matter produced was 1,296 and 1,283 g. in prairie and alfalfa, respectively, during 1935, but 2,684 and 2,498 g. during the following summer. Yield per acre from the field of alfalfa during 1935 was 3,840 lbs., from prairie 3,510 lbs. Corresponding yields for the drought year were only 1,920 and 1,459 pounds. The greater yields of alfalfa were at the expense of excess water of both soil and subsoil, which were

thoroughly dried.—J. E. Weaver.

121. GIBB, DOROTHY C. The marine algal communities of Castletown Bay, Isle of Man. Jour. Ecol. 26(1): 96-117.

2 fig. 1938.—The author found 15 communities distinctive of the different types of habitat, eg., rock, sandy mudcovered rock, pebbles, sand and pools. The Porphyra-Urospora-Ulothrix community, the Laurencia-Lomentaria community and Enteromorpha-Cladophora-Rhodochorton community and Enteromorpha-Cladophora-Chordaria community have not been previously recognized. The communities described are all perennial except, the Porphyra-Urospora-Ulothrix community, and the Enteromorpha-Cladophora-Chordaria community, the former occuring only in winter and spring and the latter in spring and summer. Many of the perennial communities, however, include so many annual and short-lived spp. that the composition of any community is usually undergoing changes. This is best illustrated in the case of the Laurencia-Lomentaria community. The communities which exhibit least seasonal change are (1) the Laminaria community, and (2) the community hanging under ledges, the composition of which remained remarkably constant throughout the year. The horizontal distribution of the vegetation in the area is chiefly influenced by the degree of exposure to wave action. The vegetation in the southern, more exposed, part of the area differs noticeably from the northern, more sheltered, part. Several communities are restricted to the southern part, e.g., the Himanthalia community, the Laurencia-Lomentaria community, while those occurring on movable sub-

strata such as sand or pebbles are confined to the most sheltered northern part. The effect of exposure is also very marked in the size and development of spp. of Fucaceae, such as Ascophyllum and Fucus vesiculosus, which occur throughout the whole area. Owing to the large tidal range and gentle slope many of the communities cover large areas of shore. In the north of the area the slope is gentlest and such communities as the Enteromorpha community, the sublittoral community on pebbles and the Laminaria community occupy very large intertidal areas strewn with sand, pebbles and boulders. In these gently sloping places the boundaries of the communities are not nearly so clearly defined as on the steeper ground towards the south.—Auth. concl.

122. [GODWIN, H. et al.] Data for the study of post-glacial history. New Phytol. 37(4): 329-332. 1938.—It is suggested that preliminary papers on this subject be published in the New Phytologist and that some uniformity of diagrams be observed. Various types of organic muds known as "dy" and "gyttja" are discussed and defined—G. D. Fuller.

123. JAESCHKE, J. Zur nacheiszeitlichen Waldgeschichte der Rhein- und Saarpfalz. (Ein ergänzender Nachtrag zur Untersuchung der rheinpfälzischen Moors.) Beih. Bot. Centralbl. Abt. B 58(2): 235-242. 2 fig. 1938.—The Jägersburg moor is considerably younger than the moors of the low-lands of the Rhine-palatinate which Firbas investigated. The pollen spectrum, from the close of the oak-mixed forest-alder period, corresponds so closely with those descr. by Firbas that the forest development, which as here found was entirely of the beech period, must have been similar to that of this period in the Landstuhl moors. The Wurzelbach moor of the Saar-palatinate began its development as a moor still later as the oak-mixed forest-alder period is absent and the beech period is already advanced, as shown by the occurrence of hornbeam. The pollen spectrum of this moor, aside from the locally conditioned over-representation of alder, also coincides with that of the synchronous part of the Jägersburg profile. It is therefore probable that the pollen deposits of the older strata would be similar to those of the Jägersburg moor and further also to those of the moorlands of the (Rhine) palatinate. The most recent forest development here disclosed agrees best in its oak-alder phase with that of the Landstuhl moors, the pollen spectra of which are supplemented by those here described.—Auth. summ. (tr. by H. F. Bergman.).

best in its oak-alder phase with that of the Landstuhl moors, the pollen spectra of which are supplemented by those here described.—Auth. summ. (tr. by H. F. Bergman.).

124. MARTIN, N. MARY. Some observations of the epiphytic moss flora of trees in Argyll. Jour. Ecol. 26(1): 82-95. 1 fig. 1938.—This district offers a favorable habitat for mosses owing to the cool winds and heavy rainfall. The mosses upon various spp. of trees were studied, special attention being paid to oaks, since they appear to form natural woodland and also because the moss upon there is natural woodland and also because the moss upon them is evidently affected by exposure. On sheltered trees the moss and lichen covering was heavy on trunk, branches, and even small twigs, and showed marked zonation. As exposure to the prevailing winds increased the moss covering became scantier, its zoning much less marked, and the vertical extent of the zones much reduced. The lowest zone on sheltered trees consisted of moss-carpet species, the middle zones of Eurhynchium myosuroides, Hypnum cupressiforme and H. cupressiforme var. filiforme, and the top zone of pioneer species such as *Ulota crispa* and *Pylaisia polyantha*. A comparison of trees on which the mosses were zoned with those on which they were not showed that the mosses most commonly found on the latter were pioneer spp., e.g., Ulota and Pylaisia. A correlation of zonation with exposure showed that all sheltered trees, and less than half the exposed trees were zoned. The results obtained for ash and other trees of which fewer individuals were examined confirmed those obtained for oak. The moss covering of ash trees was not on the whole so dense as that on oaks. Pioneer spp. appeared in lower zones than on oaks. Some study was made of the autecology of some of the most frequently encountered spp. A comparison was made of the commonest mosses growing on oak, ash. birch, and sycamore, and it was shown that the pairs on and birch, ash and sycamore, behaved differently. The differences were accounted for chiefly by differences in the roughness of the bark, chem. differences playing only a small part.-

125. MÜLLER. Jurské smrčiny. (Srovnavácí typologická studie.) [Spruce forests of the French Jura: comparative typology.] [With Fr. summ.] Lesnická Práce 17(7/8): 418-430. 3 fig. 1938.—An analysis of the vegetation of the various subtypes of the spruce forests of the French Jura.

126. NELSON, E. W. Natural rehabilitation of abandoned cropped lands. Jour. Colorado-Wyoming Acad. Sci. 2(4): 23. 1938.—After 6-10 years valuable perennial grasses begin to appear on abandoned crop lands in Colorado. Under present conditions of grazing it probably requires 80-100 years to restore the original grama grass vegetation

cover.—F. Ramaley. 127. PITT-SCHENKEL, C. J. W. Some important communities of warm temperate rain forest at Magamba, West Usambara, Tanganyika Territory. Jour. Ecol. 26(1): 50-81. Map. 1938.—On the basis of a 10% strip survey in the Shuma-Magamba forest reserve, the ecology of the warm temperate rain forest is considered. Other terms used to designate this type of forest are "subtropical evergreen forest," "mountain rain forest," "temperate rain forest," and a number of others. The altitude of the Magamba area varies from 5300 to 7600 feet. The climate is moist with a rainfall of 50-65 inches, with 2 main wet seasons, with a rainfall of 50-65 inches, with 2 main wet seasons, Nov. to early Jan., and March to June. Frosts are frequent in the valleys during the winter. The soils are grey-brown, yellow-brown, or dark-brown loam, with a reddish subsoil. In some they are characterized by a podsol condition, "tropical forest podsols" of Milne, and in others they are similar to the "brown forest soils" of Europe. This is supposed to be due to the parent material, the "acidic" speiss developing a podsol and the basic or neutral gneiss gneiss developing a podsol and the basic or neutral gneiss into brown forest soils. The forest is composed of broad-leaved evergreens, even the conifers having relatively broad leaves. The dominant trees, except for small areas of heath, swamp, and "secondary forest," are camphor. The subdominant and 2d story trees vary greatly from place to place. 26 communities of varying ecological rank are recognized and described. Although they are based for the most part on "ground flora" and "undergrowth" differences there are corresponding differences in dominant and co-dominant tree species and may therefore be considered as forest types. Their recognition may be helpful in forest practice.—S. A.

128. QUANTIN, A., et G. NÉTIEN. Aperçu sur quelques associations végétales des Alpes de l'Oisana, Bull. Soc. Bot. France 85(3/4): 159-165. 1938.—A phytogeographical study of the region including lists of the more important species observed in each of the different physiographic situations encountered.—P. D. Strasbaugh.

129. SIMPSON, J. F. HOPE. A chalk flora on the Lower Greensand: its use in interpreting the calcicole habit. Jour. Ecol. 26(1): 218-235. 1 pl. 1938.—A small area, referred to as the calcareous sand, was found on the Lower Greensand in Surrey, within 1 km. of the chalk, bearing a herbaceous flora closely resembling that of chalk grassland. Only 8 of the 45 spp. of constancy 3 or over, recorded by Tansley & Adamson for chalk grassland, were absent from this flora. The soil contained chalk intimately mixed with the sand; it was probably scattered on the land for agricultural purposes more than 50 years ago. An adjacent area on typical acid greensand soil, bearing a vegetation of the same general type as the calcareous sand, and subject to more or less similar physiographic and biotic conditions, was studied in order to use it as a rough "control experiment." The soils of the calcareous sand and acid sand areas hardly differ significantly in mechanical analysis fractions; they are both quite distinct from chalk grassland soil in this respect, but the calcareous sand is similar to it in pH and the possession of free chalk. Therefore comparison of the flora of the calcareous sand with that of chalk grassland on the one hand, and of the acid sand (supplemented by other greensand records) on the other, affords a means of studying the respective importance of physical and chemical soil factors in determining the calcicole and calcifuge habit in a few of the species of the chalk and of the greensand respectively. For the vast majority of chalk grassland species the factors determining the calcicole habit are evi-

dently chemical. This is in agreement with the view commonly held. It has been possible to group some of the species into the following classes: (1) Calcicoles determined by chemical soil factors such as Avena pubescens, Bromus erectus, Helianthemum vulgare; (2) Calcifuges determined by chemical soil factors: e.g., Calluna vulgaris, Deschampsia flexuosa; and (3) Calcifuges determined by physical soil factors: e.g., Plantago coronopus, Saxijraga tridactylites. The available data do not make it possible to consider the very hypothetical class of "physically determined calcicoles." Avena pratensis is the most important chalk grassland species absent from the calcareous sand. A simple wilting exp. indicated that for grassland vegetation drought is a more serious problem on the Folkestone beds on the Lower Greensand than it is in similar situations on the chalk .- From auth. summ.

130. STUBER, EMIL. Blattanatomische Untersuchungen an einigen Xerophyten der Walliser Felsensteppe. Beitrag zur Erkenntnis der ursächlichen Entstehung xeromorpher Merkmale unter Berücksichigung der ontogenetischen Blattentwicklung. Beih. Bot. Centralbl. Abt. A 58(1/2): 1-150. 14 fig. 1938.—In addition to the adjustments enumerated which are produced in response to the xerotherm habitat, there also are developed, in the association in which the species belongs, through the influence of the biocoenose, special anatomically-morphologically characterizable structural types (the so-called special adaptations) which are sharply delimited from the leaf modifications of the same plant from habitats outside of this association. These adaptations are restrictive phenomena the entrance of which into the ontogenetic development may be recognized, and a comparison of the developmental stages of the adapted form of all habitats with one another on the one hand with the developmental stages of the primary form on the other hand shows how these restrictive phenomena with increasing xeric influence clearly act upon the structure of the organ. The habitat restricts the development of the leaves to an extent typical for each habitat and thus causes the familiar undersized forms of the leaves which in this case are to be considered as inhibited forms. The final question of the inheritability of these inhibited forms is negated by the fact that transplanting exps. of xerophytic plants from the most xerotermic habitats to more mesophile locations brings a change in type and broad leafedness, which result is obtained also by sowing seeds.—From auth. summ. (tr. by H. F. Bergman.).

131. WATT, A. S. Studies in the ecology of Breckland. III. The origin and development of the Festuco-Agrostidetum on eroded sand. Jour. Ecol. 26(1): 1-37. 6 fig. 1938 .-The origin and development of a Festuco-Agrostidetum is described from an area of infertile sand. For the most part the species are the same in the different stages of the succession. Polytrichum piliferum is important as pioneer and accumulator of blown sand, lichens are fairly numerous and 2 of them, Cetraria aculeata and Cladonis silvatica, play leading parts, while higher plants are few, the most important being Festuca ovina and Agrostis alba and A. tenuis. The spp. of Agrostis behave in the same way and are considered together. Where there is richness in annual plants in keeping with the poverty of the soil only the least exacting species—Aira praecox and Teesdalia nudicaulis—are found. There is no continuous progression up the inclined plane of seral development from the simple to the more complex community with a corresponding increase in soil organic matter, but each stage consists of a series of progressive and retrogressive phases separated by a peak stage. The succession in short is wave-like or cyclic. The early stages occur at the foot of eroding dunes where an erosion pavement checks further removal of sand. Marginal invasion by Polytrichum piliferum leads to its dominance and sand accumulation. There follow stages dominated by Cetraria aculeata. Under the mat of mixed Cladonia-Cetraria, Polytrichum dies and the mat disinte-grates in whole or in part, exposing the soil to partial or complete erosion down to the erosion payement. On the erosion pavement the cycle begins again. Further development of the vegetation is conditioned by the presence of higher plants. *Festuca* and *Agrostis* become established vegetatively (*Festuca* in favorable seasons by seed) in the

bare stage from surviving parts brought down from the eroding bank. Their influence is local, that of Festuca being confined to a narrow ring round the tuft, that of Agrostis to the patch of soil it occupies. At this stage of develop-ment the crest of the wave consists of patches of Agrostis in a mat of Cladonia, set in a background of Cladonia-Cetraria studded with scattered Festuca. The crest of the next wave is also patchy: patches of abundant Agrostis and relatively few Festuca are set in a background with few Agrostis but many Festuca. Both have an almost continuous carpet of Cladonia. The crest of the late stage is an intimate mixture of abundant Agrostis and numerous but small Festuca again set in a carpet of Cladonia. None of these peak stages is stable; the Agrostis dies in whole or in part and the lichen carpet disrupts, leaving the soil open to erosion. The relationships between Festuca and Agrostis are described for each of the 3 stages. Where Agrostis invades a lichen community with Festuca, Cladonia becomes dominant and the number and size and therefore the total area covered by Festuca decreases. The cover per cent of *Festuca* in communities with abundant *Agrostis* tends towards 2.5. There is in each main stage a progression towards this apparent equilibrium which fails of achievement because the community disintegrates before it is reached. While a series of dry years speeds up retrogression relatively to progression both stages exist side by side. Periodicity is inherent in the vegetation itself and connected in some way with the lichen cycle. The primary cause remains obscure.-Auth. summ.

132. WEST, OLIVER. The significance of percentage area determinations yielded by the percentage area or density list method of pasture analysis. Jour. Ecol. 26(1): 210-217. 1938.—The percentage area method is discussed. The difficulty of using estimated percentage area results for the detection of change in pasture or grassland is pointed out. Although a strong correlation exists between the estimations made by different observers on the same quadrat, each observer estimates differently and the results of several observers cannot be compared until reduced to the same scale. It is proposed that the measurements of area covered made by means of a pantograph be used as a constant scale, that all observers correlate their estimations with pantograph measurements at regular intervals and that they reduce all estimated percentage area results to the pantograph scale. In deciding on the significance of change shown in results obtained by different observers at different times, it is necessary to reduce all observations to the same scale, to compute the standard deviation of the difference of the means, and to compare the difference with its standard deviation, or with the derived value,

the probable error.—Auth. summ.

133. WILLIAMS, THOMAS. Ecology of the black forest.

Jour. Colorado-Wyoming Acad. Sci. 2(4): 24. 1938.—The

"black forest" is an eastward extension of the foothill forest
upon the high plains of Colorado. Western yellow pine
dominates the hilltops, scrub oaks the sheltered slopes, and
grasses the lowlands. A high water table probably explains
the presence of pines in this plains area.—F. Ramaley.

OCEANOGRAPHY

134. ALLEN, W. E. The Templeton Crocker Expedition to the Gulf of California in 1935—the phytoplankton. Trans. Amer. Microsc. Soc. 57(4): 328-335. 1938.—This paper gives the results of study of 134 catches of phytoplankton taken in Nov., a season not before represented in the region. Although Nov. 1935 appeared to be a poorly productive month farther north, a considerable abundance (more than 100,000 cells per liter) was found at one station in the Gulf. As at other seasons in other years the region near Abreojos Point on the Pacific side of the Peninsula showed greater productivity. The genera and spp. of diatoms recorded in the Gulf were also found in the neighboring ocean although the numbers of both were notably smaller.—W. E. Allen.

135. LILLICK, LOIS C. Preliminary report of the phytoplankton of the Gulf of Maine. Amer. Midl. Nat. 20(3): 624-640. 1938.—The results of a survey of the Gulf of Maine for the period between Sept. 1933 and Sept. 1934 are presented mainly in tabular form. A complete list of the

spp. found, along with their seasonal occurrence, is presented in 3 tables. 34 tables illustrate the quantitative distribution of phytoplankton and protozoa at representative stations from the different regions of the Gulf, at all seasons, and at varying depths. A map showing the positions of these stations is included. No discussion of these data is presented here.—L. Lillick.

LIMNOLOGY

(See also in this issue Entries 431, 1071)

136. LACKEY, JAMES B. The manipulation and counting of river plankton and changes in some organisms due to formalin preservation. U. S. Publ. Health Repts. 53(47): 2080-2093. 6 fig. 1938.—All of the protistan forms in 266 samples of Scioto River (Ohio) water were obtained by centrifuging each sample, and 100 were studied and counted without killing, the remainder after preservation in 5% formalin. Since no larger forms were present, organisms were counted in a drop of water beneath a cover glass, no counting chamber being used. A definite ratio, 1 drop equaling 1, 2 or 4 ml. of raw river water, and counting of several drops at either 125 or 537 diameters gave an accurate determination of species and numbers present. Tables are given showing the checks on this method, and a detailed table is appended showing changes in 237 spp. of protozoa after formalin preservation, with suggested diagnostic characteristics.—J. B. Lackey.

137. NEEDHAM, JAMES G., and PAUL R. NEEDHAM. A guide to the study of fresh-water biology with special reference to aquatic insects and other invertebrate animals and phyto-plankton. 4th ed. revised and enlarged. 89p. 24 pl., 7 fig. Comstock Publishing Company, Inc.: Ithaca, N. Y., 1938. Pr. \$1.—A systematic guide to the plants and animals of fresh water with keys and figures, and outlines for 23 studies of special habitats.—C. A. Koford.

138. RICKER, WILLIAM E. On adequate quantitative sampling of the pelagic net plankton of a lake. Jour. Fish. Res. Bd. Canada 4(1): 19-32. 1938.—Of the various kinds of error which arise in quantitative plankton investigations, those involved in the enumeration of a collection are ordinarily smallest, though fractioning may introduce an extra sampling error, particularly when not done volumetrically. More serious are the possibilities of error in the collection of the plankters from the lake. Traps are in general more accurate than nets, but the latter are more convenient, and when made of no. 10 silk are reliable quantitative collectors of the larger organisms. The more usual no. 20 silk is very variable in efficiency. Both nets and traps appear to suffer from the ability of some plankters to see and avoid them, by day. The sampling error of a collection, considered as representing the part of the lake near which it was taken, is such as to make a single collection, containing only a moderate number of individuals, of little value in determining abundance of a species. On Cultus lake [British Columbia], collections taken at a single central station will indicate the average abundance of the pelagic plankton almost as precisely as would the same number of collections taken at various points throughout the whole pelagic region.-Auth. abst.

139. RICKER, WILLIAM E. Seasonal and annual variations in quantity of pelagic net plankton, Cultus Lake, British Columbia. Jour. Fish. Res. Bd. Canada 4(1): 33-47. 1938.—Intermittently over a 13 year period the net plankton of Cultus lake has been sampled, at a central representative station. Net plankton was not particularly rich in common spp. Of the entomostracans important as fish food, only 4 occurred. Seasonal distribution of the various spp. is of 2 principal kinds: unimodal, with one peak of abundance in late spring or summer—various green algae, Protozoa, Rotatoria, Cladocera and Epischura; and bimodal with peaks in early spring and in autumn—diatoms, mostly Rotatoria and Cyclops. Among bimodal spp. the spring maximum is ordinarily the greater. Marked differences in abundance of a plankter occur from year to year and affect both the maximal numbers attained and duration of time of proliferation. The available data do not show these annual changes to be cyclic and no definite correlation with environmental conditions has been made. The total N

content of net plankton varied from 2 to 10 mg. per l. in 1932, the dry weight from 30 to 210 mg.-Auth. abst.

140. SAUBERER, F., und O. ECKEL. Zur Methodik der Strahlungsmessungen unter Wasser. Internat. Rev. ges. Hydrobiol. u. Hydrogr. 37(4/5): 257-289. 13 fig. 1938.— Selenium rectifier photo-electric cells must be used with proper allowance for curvature of the intensity-current relation as influenced by resistance of the current meter. They cover the range u.-v. to near infra-red. Jena glass filters were used, but measurements by difference, such as between GG2 and GG3 are condemned. Transmission was studied in 10 spectral bands, using, singly or combined, UG 1, BG 12, VG 9, BG 18, OG 2, RG 1, RG 2, RG 5, RG 8, RG 9, 2 mm. thick, also NG 5, 3 or 4 mm. to reduce intensity non-selectively. Filters were carried on a revolving disc. No diffusing filter was used, save in the measurements of diffusely reflected light from the lake and from a meadow. The influence of various depths of water in shifting the center of gravity of the band transmitted by the filters is discussed, also that of the spectral sensitivity of the cell. With a completely overcast sky the reflection from the lake is only slightly greater in the red than in the green and blue, about 3-5% in each. From a meadow 35% of the deep red is reflected, falling to 1-2% about 630 mu, rising to 6% in the green and falling to about 1% in the violet. With clear sky and sun at altitudes from 10° to 39°, almost uniform spectral reflection for high altitudes was replaced by a marked increase in the reflection of the longer wave lengths at 20°, rising to about 44% for 720 m μ at 10°. In the Lunz lower lake about 2.5% of the green light reached 20 m., and this amount of blue was found at 9 m., of red at 7.5 m., of u.-v. at about 2.5 m., and of infra-red at less than 2 m. Estimates are given for the energy, in mg. cal./cm.²/min. reaching 1, 5 and 10 m. in spectral bands 50 m μ wide.—W. R. G. Atkins.

WILDLIFE MANAGEMENT-AQUATIC

(See also the section "Pisces"; and Entry 1556)

141. ALLEN, K. R. Some observations on the biology of the trout (Salmo trutta) in Windermere. Jour. Animal Ecol. 7(2): 333-349. 1938.—From a study of scales, mean annual growth was found to remain nearly constant throughout life, at about 7 cm. per year. The majority of young. fish enter the lake from the streams where hatched when 2 years old. The fish grow most rapidly during the summer time, and their relative weight is greatest during period of most rapid growth. From Oct. to Feb. the trout feed on the permanent bottom fauna, from Mar. to July on the temporary bottom fauna, and from May to Sept. on the surface food. Trout over 40 cm. long feed largely on smaller The trout population of the littoral region is estimated at 12 per 40 m. shore line, of which 50% are in their 3d year, 25% in their 4th.—S. C. Kendeigh.

143. CARRUTHERS, J. N. Fluctuations in the herrings

of the East Anglian autumn fishery, the yield of the Ostend spent herring fishery, and the haddock of the North Sea-in the light of relevant wind conditions. Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions 107: 10-15. 2 fig. 1938.—The percentage of 3-year-old herring in the East Anglian fishery varied as varied the pressure gradient controlling run of wind up the Southern Bight from the Straits of Dover during Dec. and Jan. of the season in which each year class was spawned. This relationship held for the data from 1923-24 to 1933-34. The Belgian spent herring catch showed an inverse relation. The pressure gradient measures the increased flow of air from the English Channel, which in its turn produces an increased flow of Channel water. This in its turn distributes the herring spawn more widely and more quickly sweeps the spent herring along the Belgium coast and away from the Ostend fishery. The amount of survival of haddock spawn varied as the pressure gradient, implying wind from the southeast quadrant during March, April and May, and east components in wind during Feb.-May. These wind forces and directions were measured for certain regions of the North Sea.-F. N. Clark.

144. ERDMANN, WILHELM. Ein Beitrag zur Rassenfrage beim schottischen Frühjahrshering. Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbeaux Réunions 107: 31-36. 4 fig. 1938.—A sample of 200 herring taken at 56° N. and 1° E. in Oct., 1935, analyzed as to maturity, age, growth rate, and vertebral count, consisted of 23% fall herring and 73% spring herring. The spring herring showed the same registed characters as horring of the corresponding spring s the same racial characters as herring of the same age-class taken in the Firth of Forth and on Fladen Ground and studied by Wood. This confirms Wood's conclusion that herring from the northern North Sea may come as far south as the Firth of Forth and raises further questions about the distribution of herring in the North Sea. -F. N. Clark.

145. FLEMING, F. A. A survey of small lakes as game fish retaining ponds in the Medicine Bow National Forest. Jour. Colorado-Wyoming Acad. Sci. 2(4): 30. 1938.—In Oct. the lakes were stocked with small black spotted and brook trout which were collected at weekly intervals from the following June into Sept., weighed, measured and stomach contents examined. The growth increase was 50%. The food consisted of 80% by count of amphibiotic insect larvae. chiefly Chironomidae, Ephemerida and Plecoptera. Coleoptera, Hymenoptera, Diptera, Hirudinea and Crustacea were eaten also. The water space, 1.1 cubic meters per fish, was

adequate.—E. D. Crabb.

146. GILSON, G. Variation of year-classes in an annual concentration of fish. Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions 107: 37-41. 2 fig. 1938.— The percentage strength of each year-class of spent herring appearing each season in the intermediate region between the English Channel and the North Sea was measured for 8 seasons. In each season except 1937-38, each year-class has had a higher percentage value in its 2d season in the fishery. The 1933 year-class entering as 3-year-olds in 1936-37 declined in relative numbers in 1937-38. This reversal of percentage strength is attributed to internal organic conditions of the 1933 year-class and not to ecological changes which should affect the entire population.—F. N. Clark.

hich should affect the entire population.—1.11. 147. GRAHAM, M. Phytoplankton and the herring. III. Distribution of phosphate in 1934-1936. [Gr. Brit.] Min. Agric. and Fish. Fish. Invest. Ser. II 16(3): 1-26. 1938.— Patches of Rhizosolenia styliformis of sufficient extent and density to be a bar to herring attempting to reach the usual grounds are formed when the conditions are those associated with strong Atlantic influx. The principal patch of the Southern part of the North Sea is commonly located in the South-west Dogger Bank Swirl, which is nourished with phosphate from deeper water of the Northern part of the North Sea, in the summer, when the rest of the Southern North Sea may be expected to be without phosphate, as it was in 1934.—M. Graham.

148. HICKLING, C. F. Notes on the biology of the Cornish pilchard. Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions 107: 26-28. 1 fig. 1938. Maximum feeding occurs from April to July with a secondary increase in Oct. Maximum gonad development is in April to June. Average weight is greatest in July and Dec. to Jan. Fat content fluctuates as does weight. Water and ash content vary inversely with fat content. The residue, presumably mainly protein, reaches a maximum in Oct. and

a minimum in March.—F. N. Clark.

150. OGILVIE, HELEN S. The food of post-larval haddock with reference to the annual fluctuations in the haddock broods. Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions 107: 57-66. 1938.—Of larvae collections made in 1934 and 1935, 70% of the food consisted of copepods nauplii, 20% of adult copepods, copepodids and copepod eggs. The remainder comprised early stages of euphausids, larval mollusks and microplankton. Empty stomachs were few. Nauplii counts of the plankton indicated the number in the environment under normal conditions is more than sufficient. The uniformity of the food showed that selection was made even by very young larval stages.—F. N. Clark.

151. PRATT, HAROLD PARKER. Ecology of the trout of the Gunnison River, Colorado. Univ. Colorado Stud. 26 (1): 114-118. 1938.—The food habits of the rainbow (Trutta shasta) and brown trout (T. fario), the principal trout of the Gunnison, differ in the upper and lower portions of the stream, chiefly because the large stone-fly, *Pteronarcys californica*, is absent in the upper portion. *Pteronarcys* has a 3-year life cycle, an adult age-group emerging each June. Other important food insects are species of caddis-flies, mayflies, and diptera. Cladophora is eaten by the rainbow trout. The detailed analysis of food habits was based upon careful

examination of about 500 stomachs.—G. Alexander.

152. RAE, BENNET B. Lemon sole larvae in Scottish waters during 1931. Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions 107: 42-48, Map. 1938. The greatest number of larvae of Pleuronectes microcephalus were taken at the bottom or 100 meters. More larvae were found at the surface at night. Larvae were taken in numbers in the southern part of the region in May. In June, productive hauls were made north to the Shetland Islands. Larvae were found from May to Sept. The larval distribution confirms other indications of the widespread spawning

habit of the lemon sole.—F. N. Clark.

153. REINWALDT, EDW. Salmon-markings in Esthonia and the results obtained up to the present date. Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions 107: 29. 1 fig. 1938.—In 7 years, 1565 fish were marked and 7 recovered. Three were taken at marking locality and 4 near the southern coast of Finland.—F. N.

Clark.

155. RITCHIE, ALFRED. Preliminary observations on the food of the plaice (Pleuronectes platessa) in Scottish waters. Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions 107: 49-56. 1938.—Stomach contents vary with size of fish, locality and season and in general reflect the food available. Annelids constitute an important source of food in all localities. Many echinoderms, mollusks and fish, chiefly sand eels, are also eaten.—F. N. Clark.

156. SUND, OSCAR. Die Norwegische Seefischerei. Handbuch Seefisch. Nordeuropas 8(1 a): 1-181. 210 fig. 1938. -Fishing is the 3d most important industry in Norway, from Lofoten northward it is the most important industry. The cod (Gadus morrhua) are taken mainly at Lofoten and Möre during spawning migrations, at from 8 to 12 years of age, with a size range from 70 to 100 cm. Long lines are the important gear at Lofoten and gill nets at Möre. Winter herring (Clupea harengus) are taken during inshore winter migrations, and range in size from 30 to 34 cm., with the 5- to 13-year age groups predominating. The fishery is centered south of Statt and Bergen. Ring nets and gill nets are used. It was the almost complete disappearance of this group from 1875 to 1905 that caused many fishery investigations to be inaugurated. The spawning spring herring replaces the winter herring along the coast during Feb. and Mar. and are taken mainly around Stavanger and Hangesund. This group is composed of individuals up to 5 years old. They are taken in gill nets, beach seines and some ring nets. The brisling or sprat fishery (Clupea sprattus) is centered at Stavanger, where 1- or 2-year-old individuals are taken in the protected fjords with ring nets and trap nets. The legal season is from May to Jan. Of lesser importance, but still the most frequently used fresh fish along the Norwegian coast is *Gadus virens*. These fish are taken by submerged baited traps, mainly in the summer as they migrate along the coast. This species matures at 5 years of age and at a length of 60 cm. Herring and cod represent \(\frac{2}{3}\) of Norway's fishery industry, but regular fisheries exist for many other species. Among them: halibut (Hippoglossus vulgaris), salmon (Salmo salar), haddock (Gadus aeglefinus), tuna (Thunnnus thynnus) and mackerel (Scomber scomber). In addition to the coastal fisheries, Norwegians are engaged in the Iceland, North Sea and Davis Strait areas, and especially on the many banks off the northern Norwegian coast. Of increasing importance during the last decade has been the shark and skate fishery. Important are the herring shark shark and skate isnery. Important are the herring shark (Isurus comubicus), spur dog (Squalus acanthias), ice shark (Somniosus microcephalus), Raja batis and R. clavata. The fisheries are well regulated and supported by governmental agencies. In 1935, 921,000 tons of fish were landed, having a value of 77 million Kronen.—S. R. Hatton.

157. TESCH, J. J. Observations on the herring population in the Flemish Bight and the eastern part of the Channel in the winter 1937-38. Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions 107: 21-25. 4 fig. 1938.—Average length decreased slightly as compared to the previous season. Four-year-olds were below average in abundance as well as 3-year-olds. Vertebral counts indicate that the "threes" belonged to the Downs herring type. The "fours" appeared to comprise both Downs and Channel

herring. Maturity studies indicated that in Oct. the population was of the Downs type, changing to the Channel type in Nov. or Dec. In Jan., a mixture of the 2 races seemed evident. Growth rate is subject to question due to selection

by drift nets.—F. N. Clark.
158. WHITE, H. C., and A. G. HUNTSMAN. Is local behaviour in salmon heritable? Jour. Fish. Res. Bd. Canada 4(1): 1-18. Map. 1938.—Fry from Atlantic salmon [Salmo salar] taken in Chaleur bay, near the mouth of the Restigouche river, NB., where the salmon enter early in the summer and mainly as 2-sea-year and 3-sea-year fish, were planted in 1932 in the East branch (without salmon) of the Apple river at the head of the bay of Fundy. In this region the local salmon enter only in the autumn and nearly all as 1-sea-year fish (grilse). The Restigouche fish as parr grew more rapidly than the local fish, corresponding with the less crowded conditions in the East branch. The smolts were marked by removal of the adipose fin when descending to the sea in 1934. Their descent occurred from May 12 to June 20, being markedly accelerated by rainfall. Traps were placed on both branches in 1935, giving in the autumn 92 marked grilse entering the East branch and 6 the South. The traps in 1936 gave in the autumn, 5 marked 2-sea-year salmon entering the East branch and 1 the South. No difference in appearance or behavior was observable between these and the local salmon of the South branch.—Auth.

159. WICKLIFF, EDWARD L. Additional returns from fish tagged in Ohio. Trans. Amer. Fish. Soc. 67: 211. 1937 (1938).—106 returns from fishermen for gill-tagged wild Lake Erie breeder fish and hatchery fingerlings released in the streams of Ohio, show that 37% of the fish moved 10 miles or less; 20%, 11-25 miles downstream; 26%, 26-50 miles downstream; 12%, 51-100 miles downstream, and 5%, 100-205 miles with the current. The fish taken by fishermen included 35 smallmouth bass [Micropterus dolomieu], 28 channel catfish [Ictalurus l. lacustris], 25 rock bass [Amblophites rupestris], 14 bullhead catfish [Ameiurus n. nebulosus and A. m. melas], 3 largemouth bass [Huro salmoides], and

1 carp [Cyprinus carpio] .- E. L. Wickliff.

WILDLIFE MANAGEMENT—TERRESTRIAL

(See also the section "Aves"; and Entries 59, 784, 1300) 160. BENNITT, RUDOLF, and WERNER O. NAGEL. A survey of the resident game and furbearers of Missouri. Univ. Missouri Stud. 12(2): 1-215. 10 maps, 8 fig. 1937.

161. CHARD, J. S. R. Birds, animals and afforestation. Scottish Forest. Jour. 52(2): 96-102. 1938.—Notes on the change in bird and mammal population following afforestation of heath land in Scotland. Most of the original spp. of birds tend to disappear, and their place is taken by a larger number of other spp. by the time the forest reaches pole stage (about 20 yrs.). The original spp. of mammals generally remain, and many others come in as the forest affords

cover.-W. N. Sparhawk.

162. CORDIER-GONI, PAUL. Les Castors en Suède d'après une étude de M. Lars Faxen (1935). Bull. Soc. Nat. Acclimat. France 84(11/12): 270-274. 1937(rec'd 3-13-38).— In 1880 the beaver was wild in Norway but not in Sweden. Its limits were east, the coast south-west of Wolden and Drangedal; west, the river Mandal; north, the river Verije in the Telemarken. About 1911 (probably on account of protection) it increased so much as to become of importance in hunting, trapping, and export. By 1927 there were 12,000-14,000. In 1922 Sweden, almost identical in climate and flora, planted one pair of beavers on the river Bjurälven in Jämtland, in the Northwest and in 1925 in 10 more places. Though the beaver does not endure transport well, is subject to serious diseases, and is weakened by inbreeding, there

were 200-300 by 1935—A. Norrington.
163. FISHER, JAMES, and L. S. V. VENABLES.
Gannets (Sula bassana) on Noss, Shetland, with an analysis of the rate of increase of this species. Jour. Animal Ecol. 7(2): 305-313. 1938.—An increase from 1 pair in 1914 to 1,518 breeding pairs in 1938 is noted. This rapid increase is largely due to new colonization from the outside, which lasted until, at least, 1935. A supposition is made that gannets first breed 4 years after hatching. Gannets prevent guillemots (*Uria aalge*) from nesting within "beak range" of their own nests.—S. C. Kendeigh.

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164. FORD, JOHN, HELEN CHITTY, and A. D. MIDDLE-TON. The food of partridge chicks (Perdix perdix) in Great Britain. Jour. Animal Ecol. 7(2): 251-265. 1938.—The contents of 69 crops were analyzed by number, volume, and frequency of occurrence. The food of the young for the first 2 weeks after hatching is predominantly animal, during the 3d week it is partly vegetable, and from 3 weeks on the food is almost entirely vegetable.—S. C. Kendeigh.

frequency of occurrence. The food of the young for the first 2 weeks after hatching is predominantly animal, during the 3d week it is partly vegetable, and from 3 weeks on the food is almost entirely vegetable.—S. C. Kendeigh.

165. MOREAU, R. E., and W. M. MOREAU. The comparative breeding ecology of two species of Euplectes (bishop birds) in Usambara. Jour. Animal Ecol. 7(2): 314-327. 1938.—E. nigroventris breeds from the period of highest daily temps. to the middle of the cool period; E. hordeacea breeds during the coolest months. Considerable irregularity occurs from year to year in date at which general breeding occurs. In neither species does availability of food or topography affect size or position of the territory, although in E. hordeacea grass is always present and in E. nigroventris there may be none. In E. hordeacea the size of the territory is rather definite at about 900 sq. yds. and is not much compressed by an abundance of 33; in E. nigroventris territories are very compressible, even to under 10 sq. yds. Population density can thus be limited by size of territory in the one species but not in the other. Both spp. are polygamous, E. nigroventris with up to 5 breeding \$9 at one time, E. hordeacea with not more than 3. In the breeding populations of both spp. 99 outnumber 34.4:1—S. C. Kendeich

nagroventris with up to 5 preeding 11 at one ame, 2. hordeacea with not more than 3. In the breeding populations of both spp., \$\partial 2\$ outnumber \$\partial 3\$ 4:1.—8. C. Kendeigh.

166. RUEDEMANN, RUDOLF, and W. J. SCHOON-MAKER. Beaver-dams as geologic agents. Science 88 (2292): 523-525. 1938.—From study of present beaver habits and knowledge of the numbers of beavers known to be present in past centuries, it is concluded that beavers are able to aggrade all smaller valleys below the size of navigable rivers and, having been active for many thousands of years, have accomplished an enormous amount of aggrading and are important physiographic agents. Their work is characterized by complete aggrading of valley floors, the original small steps disappearing leaving a gently graded, even valley plain horizontal from bank to bank. The fine silt gathered in the beaver pools has produced rich farm

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land in the valleys of the wooded areas of the northern half of N. America.—M. C. Johnstone.

167. SCOTT, JOHN W. Some effects of drowth years on the bird and animal population of Wyoming. Jour. Colorado-Wyoming Acad. Sci. 2(4): 27. 1938.—The plains areas were much more affected than higher altitudes in the National forests. Bird population outside these forests dropped fully 50% and in certain spp. 75% between 1931 and 1936, but recovered 25% in 1937 due to heavy rainfall.—E. D. Crabb.

168. VEVERS, H. G., and F. C. EVANS. A census of breeding gannets (Sula bassana) on Myggenaes Holm, Faeroes. Jour. Animal Ecol. 7(2): 298-302. 1938.—Direct counting showed a breeding population in 1937 of 3,230 birds. Increased kill by man during the last 200 years may be correlated with increased size of colony.—S. C. Kendeigh.

169. VEVERS, H. G., and JAMES FISHER. The 1938 census of gannets (Sula bassana) on Ailsa Craig. Jour. Animal Ecol. 7(2): 303-304. 1938.—Direct counting revealed a population of 5,387 pairs, a decrease of 9.4% since 1937.—S. C. Kendeigh.

170. WHITE, H. C. The feeding of kingfishers: food of nestlings and effect of water height. Jour. Fish. Res. Bd. Canada 4(1): 48-52. 1938.—Kingfisher (Megaceryle alcyon) nestlings on the Margaree river, Nova Scotia, are fed young salmon and trout only, whose average size increases with that of the bird, indicating selection by the parents. The proportion of trout (Salvelinus fontinalis) to young salmon (Salmo salar) in the food of the adults varies directly with the height of the water.—Auth. abst.

171. WINTERBOTTOM, J. M. On three bird censuses in woodland in northern Rhodesia. Jour. Animal Ecol. 7 (2): 266-271. 1938.—All birds were counted over a strip 20 yds. wide on 3 short trips during late Oct. and early Nov. at the end of the dry season. The country censused was mostly hilly Brachystegia woodland, rather barren and without surface water. The average population was 2.6 birds per acre (51 spp.), which agrees well with previous studies in other parts of Africa.—S. C. Kendeigh.

ALGAE

(See also in this issue Entries 79, 121, 134, 147, 1386, 1586)

1064. DROUET, FRANCIS. The Brazilian Myxophyceae. II. Amer. Jour. Bot. 25(9): 657-666. 1938 .- A review, with critical remarks, of both new and historical specimens representing the group in the Brazilian flora. Synonymy is explained, and a new form is descr. in Porphyrosiphon.-F. Drouet

1065. FELDMANN, J. Sur le développement des tétraspores du Caulacanthus ustulatus (Mertens) Kützing (Rhodophyceae). Bull. Soc. Hist. Nat. Agrique du Nord 29(3/4):

298-303. Illus. 1938. 1066. FENTON, E. W. Algae studies from Boghall Glen (Midlothian). IV. Soil algae. Scottish Nat. 234: 165-172.

1938

1067. GEITLER, LOTHAR v. Der Zusammenhang der Zellen fadenförmiger Cyanophyceen. Ber. Deutsch. Bot. Ges. 56(5): 163-164. 1938.—A discussion of the possibility of plasmodesma in 2 orders of the Cyanophyceae. There is a physiological and morphological connection between cells of the Hormogonales although plasmodesma are lacking. In the Chamaesiphonales there are no such connections. H. C. Beeskow.

1068. KÜSTER, ERNST. Normale und abnorme Keimungen bei Fucus. Ber. Deutsch. Bot. Ges. 55(10): 598-605. 1937.—Various normal and abnormal forms of germination in *F. serratus* are described. When unfertilized eggs are germinated on agar various flat, expanded bodies are formed. After fertilization these bodies become surrounded by a sheath and then form various shaped multicellular structures. This active expansion of protoplasm often causes a necrosis in the periphery of the body of both poorly and normally

developed zygotes. A membrane will frequently form between the necrotic and living protoplasm. The egg protoplast may divide into many fragments and fertilization of anucleate fragments is frequently observed (merogony). Such fragments may become ensheathed but they never divide.— $H.\ C.\ Beeskow.$

1069. NEUBAUER, HANS FRANC. Der Tagesgang der Assimilation von Rivularia haematites (D. C.) Ag. an einem überrieselten Felsen. Planta 28(4): 730-742. 1938.—Photosynthesis was studied by changes in conductivity of the water. Differences in photosynthetic rate are due to insulation and temp. Values rose to 6 mg. of CO₂ per sq. dm. per hr. Highest intensities occurred before noon unless the weather was very dark. The plants were principally *Rivu*laria haematites and Eucladium verticillatum.—B. R. Nebel.

1070. OKADA, Y. Studies on the Japanese Prasiolaceae. [In Jap. with Eng. summ.] Jour. Jap. Bot. 14(7): 469-480.

Illus. 1938.

1071. OLSON, THEODORE A. A note on the appearance of platydorina caudata Kofoid, as an important component of a "water bloom" in Minnesota. Trans. Amer. Microsc. Soc. 57(4): 322-327. 1 pl. 1938.—This uncommon member of the Volvocales appeared in large numbers in a polluted section of the Minnesota River near New Ulm, Minn., in June, 1934. Both types of colonies described by Kofoid occurred and their structure agreed well with that of the type species. Abundant growth of the organisms in response to the high nitrate associated with pollution was indicated. -T. A. Olson.

FUNGI

Editor: C. L. SHEAR. Associate Editor: EDITH K. CASH

(See also in this issue Entries 44, 131, 969, 972, 1033, 1057, 1417, 1423, 1424, 1425, 1427, 1429, 1453, 1476)

FUNGI

1072. BEELI, M. Étude de la flore mycologique Africaine. Note sur des basidiomycètes récoltes a Sierra Leone par F. C. Deighton. Bull. Jard. Bot. Etat Bruxelles 15(1): 25-44. 4 pl. 1938

1073. BOSE, S. R. The occurrence of a dense mass of thick-walled fringe-hyphae covering the hymenium of Daedalea flavida Lév. Ann. Mycologici 36(2/3): 154-155. Illus.

1074. CIFERRI, R. Mycofiora domingensis exsiccata. (Cent. III, no. 201-300). Ann. Mycologici 36(2/3): 198-245. 1938.—CHRYSACHNE and PANTOSPORA described.

1075. FAVRE, JULES, et RENÉ MAIRE. Sur un Naucoria des tourbières jurassiennes. Bull. Trimestr. Soc. Mycol. France 53(3/4): 267-270. 1 fig. 1937(rec'd 5-18-38).—N.

1076. MAINS, E. B. The genus Blastospora. Amer. Jour. Bot. 25(9): 677-679. 1938.—The uredinia and telia of B. smilacis (type species) and B. itoana develop superstomatally. Descriptions are given of the genus and these spp. Other spp. previously assigned to the genus are transferred as follows: B. butleri, to Chaconia; B. hygrophilae and B. ascotela, to Maravalia.—E. B. Mains.

1077. MAIRE, R. Un nouveau Xerula. Bull. Trimestr. Soc. Mycol. France 53(3/4): 265-266. 1937(rec'd 5-18-38).—X.

caussei.

1078. MARTIN, G. W. The morphology of the basidium. Amer. Jour. Bot. 25(9): 682-685. 1938.—Neuhoff's concept of basidial morphology is defended against recent criticism. Certain modifications are suggested and terms defined.-G. W. Martin.

1079. MOUNCE, IRENE, and RUTH MACRAE. Interfertility phenomena in Fomes pinicola. Canadian Jour. Res. Sect. C. Bot. Sci. 16(9): 354-376. 1 fig. 1938.

1080. SHOPE, PAUL F. Notes on Colorado operculate discomycetes. Univ. Colorado Stud. 25(4): 233-235. 1938.— Lists and discusses 9 infrequent spp., some new to Colorado.

1081. WESTERDIJK, JOH. (Director). Supplementary

list of cultures 1938. (Centraalbureau voor Schimmelcultures Baarn, Holland.) 11p. Koninklijke Nederlandsche Akademie

van Wetenschappen: Amsterdam, 1938.

1082. WHIFFEN, ALMA J. Aphanomyces phycophilus in culture. Amer. Jour. Bot. 25(9): 649-650. 7 fig. 1938.— A. p., formerly thought to be an obligate parasite, was isolated from Spirogyra and grown with the production of sexual organs on a maltose-peptone agar consisting of 3 g. maltose and 1 g. peptone in 1000 cc. of 2% agar. The size of the hyphae and the mode of growth of A. p. on agar are different from that of any other Aphanomyces. The addition of vitamin B₁ to the agar increased the size of the hyphae

and the amount of growth.—A. J. Whiffen.

1083. ZENKERT, C. A. The Clinton herbarium. In Seventy-five years, A history of the Buffalo society of natural sciences 1861-1936. Bull. Buffalo Soc. Nat. Sci. 18: 101-105. 1938.—Herbarium of George W. Clinton.

MYXOMYCETES

1084. MARTIN, G. W., and T. E. BROOKS. A new Myxomycete. Trans. Amer. Microsc. Soc. 57(4): 319-321.

5 fig. 1938.—Didymium parietale* from Kansas.—Authors. 1085. SMART, ROBERT F. The reactions of Myxomycetous swarm-cells to temperature. Amer. Jour. Bot. 25(9): 679-682. 1938.—The activity of the flagellate swarm-cells of the 24 endosporous Myxomycetes studied is influenced by temp. The temps, above room temp, at which quiescence of the swarm-cells occurs varies with the species and ranges from 34° to 43°C. The optimum temp, for the normal activity of the swarm-cells varies with the species and ranges from 27° to 34° C. At temps. below room temp., swarm cells of all spp. studied are slowed down; some, e.g., Fuligo septica, Enteridium rozeanum, and Arcyria denudata, withstand 2° C without encysting immediately.—R. F. Smart.

LICHENES

1086. ABBAYES, H. des. Considérations sur la symbiose lichénique et ses différentes modalités. Bull. Soc. Sci. Bretagne 14(3/4): 130-136. 1937(1938). recoltées dans les diverses herborisations. Bull. Soc. Bot.

France 85(3/4): 117-156. 1938. 1149. GATES, FRANK C. Kansas botanical notes, 1937. Trans. Kansas Acad. Sci. 41: 97-98. 1938.—Miscellaneous notes including recording of a natural cross between Atlas

sorgo and Johnson grass.-Author.

1150. GATES, FRANK C. Woody plants, native and naturalized in Kansas. Trans. Kansas Acad. Sci. 41: 99-118. 208 maps. 1938.—An annotated list of the 225 woody plants of Kansas, including as native 107 trees, 80 shrubs and 20 lianas, accompanied by county maps of distribution of each obtained from specimens in the state and other herbaria.-Author.

1151. GAUSSEN, H. Compte rendu des herborisations au Plantaurel, au Pech de Foix, à Ussat, faites le 21 juillet,

1931. Bull. Soc. Bot. France 85(3/4): 82-91. 1938.

1153. GAUSSEN, H. Compte rendu de l'herborisation à l'Hospitalet faite le 22 juillet 1931. Bull. Soc. Bot. France 85(3/4): 96-98, 1938. 1154. GAUSSEN, H. Notes sur l'importance de la valée

de l'Ariege et du massif du Carlit commes limites. Bull.

Soc. Bot. France 85(3/4): 98-104. 1938.
1155. GAUSSEN, H. Notes sur l'importance de la Cerdagne comme limite. Bull. Soc. Bot. France 85(3/4): 105-110. 1938.

1156. GAUSSEN, H. Compte rendu de l'herborisation dans la vallée de l'Aude faite le 28 juillet 1931. Bull. Soc.

Bot. France 85(3/4): 115-117. 1938.

1156A. GAUSSEN, H., et F. FLOUS. Compte rendu de l'herborisation au Pic de Montgailhard faite le 21 juillet 1931. Bull. Soc. Bot. France 85(3/4): 91-95. 1938.

1157. IL'IN M. M. K proiskhozhdenifu flory pustyn Srednei Azii. [Origin of the desert flora of Central Asia.] [In Russ.] Sovetskaia Botanika [Soviet Botany] [Leningrad]

1937(6): 95-109. Maps. 1938.

1158. ST. JOHN, HAROLD. Flora of southeastern Washington and of adjacent Idaho. xxv+531p. Col. map, 11 fig. Students Book Corporation: Pullman, Wash. Pr. cloth \$3.70; paper \$3.20. 1937.—This descriptive flora covers southeastern Washington and a narrow adjoining strip of Idaho, or more specifically, in Washington: Spokane, Whitman, Asotin, Garfield, Columbia Counties, and the eastern part of Walla Walla County, and in Idaho the adjacent boundary strip 15 miles wide. The introduction includes sections on the physiography, climate, life zones, size of the flora, concept of genera and species, taxonomy, nomen-clature, common names, habitat and distribution, and measurements. The life zones of Merriam are used, though it is demonstrated that even the indicator plants are not constant to one life zone. "The life zones do not seem to be scientific concepts capable of precise definition. On the other hand they are generalizations of the mass association of plants characteristic of the great physiographic and climatic areas." The zones represented are those from the Upper Sonoran to the Hudsonian. The flora includes 1,473 species or subdivisions of species, 1,266 of which are indigenous. The author has attempted to accept only the so-called Linnaean genera and species. The Engler & Pranti system of plant families is followed, but with a few exceptions. The nomenclature agrees with the latest International Rules. Common names are included, but only the genuine folk names. Statements of altitude or distance are given in English feet or miles, following the official maps. Measurements of plants or their parts are in the metric system. A table and paired rules of equivalent measures are included. The analytical key to the families is complete, has the page references, and has eleven line cuts illustrating structures which are frequently misunderstood by students.

Keys to the genera and species are interpolated in the text. These are dichotomous, and often with two or three correlated characters. Special keys are provided for the very technical groups. For Salix and Antennaria there are two keys, one for each sex. For Allium there is one key to flowering specimens, one to specimens with only bulbs and leaves. For the Umbelliferae and for Cogswellia there are two keys, one for flowering, one for fruiting material. Indigenous plants are distinguished from the adventives by a different type font. Each species has a detailed, new description. Important synonyms are cited. For each plant are given the local range and life zone. Economic or historic notes are appended to many species. At the end of the book are a complete glossary, an explanation of authors' names with dates of birth and death and nationality, a list of the newly described plants or new combina-tions, and a single index to scientific and common plant names. N. spp. are published in Muhlenbergia (1), Panicum names. N. spp. are published in Municipergia (1), Famcum (1), Poa (1), Camassia (1), Horkelia (1), Rosa (4), Lathyrus (1), Geranium (1), Glossopetalon (1), Cogswellia (1), Ligusticum (1), Cryptantha (1), Arnica (1), Balsamorhiza (1); n. vars. in Danthonia (2), Stipa (1), Thalictum (1), Rosa (1), Lupinus (2), Trifolium (1); n. forms in Mitella (1), Phys. (1), Spharylea (1), Cogswellia (1), Phys. (1), Ribes (1), Sphaeralcea (1), Cogswellia (1), Phlox (1), Synthyris (1), Valeriana (1); n. names or n. combs. affect the genera Agrostis, Bromus, Elymus, Sphenopholis, Tri-setum, Stipa, Juncus, Avena, Goodyera, Spiranthes, Arceu-thobium, Razoumojskya, Polygonum, Delphinium, Thalictum, Rubus, Melanobatus, Lathyrus, Lupinus, Geranium, Linum, Viola, Mentzelia, Bartonia, Epilobium, Cogswellia, Lomatium, Cornus, Suida, Dodecatheon, Centaurium, Gilia, Collomia, Hesperochiron, Capnorea, Lonicera, Githopsis, Artemisia, Haplopappus, Pyrrocoma, Hieracium.—H. St. John.

1159. SAYEEDUD-DIN, M. A further contribution to some of the common flowering plants of the Hyderabad state; their distribution and economic importance. Jour. Bombay Nat. Hist. Soc. 40(2): 191-212, Map. 1938.

1160. TATEWAKI, M. Taxonomical study on plants growing in the alpine belt in Yezo. III. [In Jap.] Jour. Sapporo Soc. Agric. and Forest. (Sapporo Norin Gakkwaiho) 29(143): 1-26. 1938.

1161. TRYON, R. M. Jr. Recent additions to the flora of Indiana. Proc. Indiana Acad. Sci. 47: 76-77. 1937(1938).

-Plants are reported as new to Indiana.

1162. ZAPRTAGAEV, F. L. Dreveshafa i kustarnikovafa rastitel'nost Tadzhikistana. [Trees and shrubs of Tadjikistan.] [In Russ.] Sovetskaia Botanika [Soviet Botany] [Leningrad] 1937(6): 70-95. Folding map. 1938.

1163. ZEMÉE. GEORGE. La végétation des falaises du nord de la Hague (Manche). Bull. Soc. Bot. France 85(3/4): 189-200. 1 fig. 1938.—This vegetation is a typical example of the vegetation of the cliffs of the Armorican wall. In its entirety there are some characters in common: the strong impregnation of the European-Atlantic element making the Armorican cliffs one of the more Atlantic landscapes of the West of France; the constantly high humidity permitting the presence of hygrophilous or sciophilous species upon a dry and open substratum. The local modification of certain ecological factors brings about the formation of different plant groupings; these factors are the direct influence of the sea which is responsible for a vegetation increasingly halophytic from the top to the bottom of the cliffs, the physical structure of the substratum, earthy or rocky, and the destructive grazing of the natural heath of Pteridium aquilinum and Ulex gallii .- P. D. Strausbauah.

MORPHOLOGY AND ANATOMY OF VASCULAR PLANTS

(See also in this issue Entries 36, 81, 1112, 1117, 1139, 1331, 1372)

V1164. BAIRD, A. M. The suspensor and embryo of Actinostrobus. Jour. Roy. Soc. Western Australia 23(1936/37): 89-95. 2 pl. 1936/37.—A. pyramidalis, A. acuminatus. 1165. BUCHET, S. Sur le genre et la signification du coléoptile. Bull. Soc. Bot. France 85(3/4): 171-173. 1938.—A criticism of the wrong use of the term and attempt to clarify its meaning.—P. D. Strausbaugh.

1166. CARLSON, MARGERY C. The formation of nodal adventitious roots in Salix cordata. Amer. Jour. Bot. 25 (9): 721-725. 8 fig. 1938.—Roots arise on stem-cuttings from definite places at and near the nodes. The nodal roots develop from primordia which are present in the stems before their removal from the tree. A primordium is formed from parenchymatous secondary cells, above a leaf or branch

gap. The cells in the outer part of a vascular ray in this region enlarge and become meristematic. Neighboring cells undergo similar changes until the secondary cells outside the cambium, including several rays, are involved in the formation of a primordium. The cambium adds cells to the inner surface of the primordium. A hemispherical protuberance, formed by the enlargement of cells of secondary xylem adjacent to the primordium, pushes the center of the primordium outward, making it dome-shaped. The primordia appear in early June in the lower, but not in the 3 or 4 lowermost, nodes of the developing branches. They are formed progressively upward in the nodes of the growing branches during the summer. By autumn they have reached their maximum development except in the youngest nodes. They remain dormant unless the branches are removed from the tree and placed in conditions favoring the growth of the primordia into roots.—M. C. Carlson.

1167. ESAU, KATHERINE. Ontogeny and structure of the phloem of tobacco. *Hilgardia* 11(8): 343-406. 18 pl., 14 fig. 1938.—A detailed developmental study of the phloem of petioles and stems of Nicotiana tabacum and N. glauca beginning with the first protophloem sieve tube and ending with secondary phloem in several-year-old stem. There is an expensive bibliography.—K. Esau.

1168. ESAU, KATHERINE. The multinucleate condition

in fibers of tobacco. Hilgardia 11(8): 427-431, 2 pl. 1938,-The fibers of the primary external and internal phloem of Nicotiana tabacum and N. glauca show repeated nuclear divisions with omission of cytokinesis.—K. Esau.

1169. HAGERUP, O. On the origin of some angiosperms through the Gnetales and the Coniferae. III. The gynacium of Salix cinerea. K. Danske Videnskab. Selskab. Biol. Meddelel. 14(1): 1-34. 49 fig. 1938.—Following the writer's studies on gynaecia having a central placenta, S. cinerea is here used to represent the type with parietal placentation. A study of the development of the pistil in this species fails to confirm the current theory of carpel morphology, for the margins of the carpels do not curve inwards, they do not swell, and they do not form the placentae, but constitute merely an involucre of coalescing and barren leaves. The view is held that the placentae are prolongations of the floral axis, and the ovules are regarded as complete foliar organs—"monosporangiate macrosporophylls." Evidence from teratology is adduced in support of this view .-M. A. Chrysler.
1170. HAYWARD, HERMAN E. The structure of eco-

nomic plants. x+674p. Frontispiece, 340 fig. Macmillan Co.: New York, 1938.—This book presents in considerable detail the descriptive anatomy of a selected group of economic plants. Emphasis is placed on "developmental anatomy." Part I, General Anatomy, "supplements other works on anatomy" in providing a foundation of general information for Part II. "Cells and Tissues," "The Root," "The Shoot," and "The Flower and Fruit" are discussed.

In Part II 16 plants (maize, wheat, onion, hemp, beet, radish, alfalfa, peas, flax, cotton, celery, sweet potato, potato, tomato, squash, lettuce) are discussed and rather fully illustrated. "Economic importance, suitability as a representative of the family to which it belongs, and the intricacy of its anatomical and morphological detail" determined the choice of these plants. "Fruit crops have been omitted because a second volume is contemplated." In presenting the material "the available data have been freely drawn upon," but the author has added much that is new. A glossary is added and a bibliography is appended to each

chapter.—A. J. Eames.
1171. KAJALE, L. B. Embryo and seed development in the Nyctaginaceae. I. Studies in the genus Boerhaavia. Jour. Indian Bot. Soc. 17(4): 243-255. 1938.—The 1st division of the cospore in B. diffusa and B. repanda is by a transverse wall to form a basal and apical cell. The former then divides repeatedly to make the embryo 5 cells long. Simultaneously with these transverse divisions progressing in the basal cell longitudinal walls begin to appear in the proembryo. These first appear in the apical cell, next in the penultimate cell and finally in the 3d cell from the apex. These 3 cells along with a 4th cell adjacent to the 3d give rise to the embryo proper. The apical cell gives rise to the plumule and the cotyledons. The 2d and 3d form the hypocotyl and the greater part of the radicle, while the 4th cell is the hypophysis and completes the root apex. The periblem is cut off from the dermatogen and is not a sister layer of the plerome. The suspensor is long and slender in B. diffusa and short and massive in B. reparda. Polyembryony occasionally results from the development of an extra embryo from a synergid in B. repanda. The endosperm becomes cellular only in the micropylar region of the embryo-sac. The testa and pericarp fuse together in

the mature seed.—L. B. Kajale.

1172. KING, J. R. Morphological development of the fruit of the clive. Hilgardia 11(8): 437-454. 4 pl., 2 fig. 1938.—These investigations of Olea europaea, var. Mission, were concerned with (1) the development of the flower, (2) the general vascular relations in the flower, (3) the development of the macrogametophyte, and (4) the general morphological changes involved in the development of the fruit. The characteristics involved in the development of the flower are considered as expressions of perigyny. In the floral vascular structure, 8 of the 16 upper pedicel bundles contribute to the 4 petals, 4 sepals, and 2 sepal appendage bundles; the remaining 8 contribute to the 2 abaxial, the 2 adaxial, and the 2 stamen bundles, then continue as ovary wall bundles. Development of the 8nucleate macrogametophyte follows the Scilla type. The general development of the ovary was traced from fertilization to maturity, noting changes in cell types during growth and the structure of the mature fruit. The fruit is regarded as a drupe.—J. R. King.

AGRONOMY

Editor: CARLETON R. BALL. Associate Editors: M. A. McCALL, Crops; R. B. DEEMER, Soils (See also in this issue Entries 71, 73, 84, 101, 108, 110, 126, 132, 263, 1027, 1030, 1034, 1045, 1227, 1228, 1234, 1238, 1248, 1316, 1319, 1331, 1350, 1351, 1354, 1366, 1387, 1407, 1472, 1477, 1480)

CROP SCIENCE (ARVICULTURE)

1173. AHLGREN, H. L., G. BOHSTEDT, and O. S. AAMODT. Problems in evaluating pastures in relation to other crops. Jour. Amer. Soc. Agron. 30(12): 1020-1029. 1938.—13 methods used in the eastern part of the U.S. in evaluating pasture crops are reviewed. The need for, and desirability of, developing a satisfactory standardized technic for evaluating various types of pasture crops in relation to each other and to other harvested feed crops is discussed. -Authors.

1174. ANDERSON, J. ANSEL, and C. ALAN AYRE. Varietal differences in barleys and malts. 1. Nitrogen distribution among protein fractions of barley. Canadian Jour. Res. Sect. C. Bot. Sci. 16(9): 377-390. 1938.—Detns. of total N and N fractions were made on 144 samples of barley representing 12 vars. grown at each of 12 widely separated exptl. stations in Canada. A highly significant

positive correlation between alcohol-soluble protein N and total N was found both within and between vars. No correlation between total N and other N fractions was found between vars.; but significant positive correlations were found within vars. that for insoluble protein N being considerably higher than those for total salt-soluble N, salt-soluble protein N, and non-protein N. With increasing. total N, the proportion in salt-soluble form decreases, that in alcohol-soluble form increases, and that in insoluble form remains constant. The results thus support Bishop's "Protein regularity principle." Mean varietal differences were found with respect to each N fraction, but elucidation of differences in N distribution patterns was complicated by the effect of varietal differences in total N content. Statistical analyses demonstrated the validity of eliminating this effect by adjusting varietal means for fractions to values corresponding to equal total N contents. When this was

done it was found: that the 3 2-rowed vars., Charlottetown 80, Hannchen, and Victory, were higher in alcohol-soluble protein N and lower in insoluble protein N than any of the 6-rowed vars.; and that the 4 smooth-awned 6-rowed vars., Nobarb, Regal, Velvet, and Wisconsin 38, were lower in total salt-soluble N and higher in insoluble N than any of the rough-awned 6-rowed vars., O.A.C. 21, Mensury Ott. 60, Olli, Peatland, and Pontiac. Owing to the variation between vars. within classes, and the small number of vars. studied, the mean differences between the 3 classes are not statistically significant. Nevertheless, since by comparison with the rough-awned 6-rowed vars., the 2-rowed vars. yield higher malt extracts, and the 4 smooth-awned vars. yield lower malt extracts, and the 4 sincon-awned vars, yield lower malt extracts and are lower in enzymic activity, and there are indications of a possible relation between N distribution and malting quality.—From auth. summ.

1175. AVANZI, E. Nuove razze di grano in prova. Italia Agric. 75(8): 555-560. Illus. 1938.

1176. BOURGOIN, KELLERMANN, et TRAN-PHUC-SAN. Note sur les résultats obtenus par l'irrigations des cultures de mais. [Results obtained by irrigation of maize.] Bull. Écon. Indochine 41(2): 321-328. 1938.

1177. BOYD, F. T., O. S. AAMODT, G. BOHSTEDT, and E. TRUOG. Sudan grass management for control of cyanide poisoning. Jour. Amer. Soc. Agron. 30(7): 569-582. 1938.—Sudan grass which is short and dark green is high in cyanide and dangerous to pasture. Second growth after pasturing or removal of a hay crop when short and dark green is especially dangerous. Sudan grass 2 feet or more high, whether 1st or 2d growth, is usually low in cyanide. Sudan grass, short or tall, which is of a pale or yellowish green color is low in cyanide. Both from the standpoint of danger from poisoning and possibility of obtaining the most pasture, Sudan grass usually should not be pastured until it has reached a height of 2-3 feet. A high level of available N and a low level of available P in the soil tend to increase the poison content; a low level of available N and a high level of available P have the opposite effect. Drought probably operates as a factor largely by keeping the plants small, in which stage they are always much higher in cyanide than when larger. When Sudan grass is dried and made into hay, the cyanide poison content does not change greatly—E. Truog.

1178. CALDWELL, JOSEPH S., HUBERT H. MOON, and CHARLES W. CULPEPPER. A comparative study

of suitability for drying purposes in forty varieties of the sweet potato. U. S. Dept. Agric. Circ. 499. 1-49. 1938.— A method of drying the sweet potato in a form which may subsequently be prepared for the table in a variety of ways—as baked or candied, creamed, sauteed, or French fried sweet potato, or as pie filler—was developed: it consists in peeling by abrasive machine or immersion in hot lye soln., washing and trimming, cutting into longitudinal strips or slices, immersing in dilute citric acid soln. to prevent discoloration, spreading on trays, steaming until practically completely cooked, and drying at 130-165° F to a residual moisture content of 12 to 15%. When so prepared the material was not hygroscopic and could be stored for prolonged periods without deterioration in appearance or quality if protected from access of weevils and beetles, to which it is definitely attractive although it is not attacked by the ordinary dried-fruit insects. Material may be dried either immediately after digging or subsequent to curing and storage; the products made from a given var., before and after curing will differ somewhat in appearince, flavor, and behavior in cooking. About 70 vars. and trains were studied comparatively over a series of years to determine their suitability for drying; a number of these were rejected as unpromising because of inherent poor ruality, low yields, lack of resistance to common diseases, or other undesirable characters. The vars, which combine atisfactory appearance and quality of the dried product with satisfactory productiveness and disease resistance are anked into groups, the members of each group being considered as of approx. equal quality. Of these, Nancy fall, Myers' Early, Mullihan, and Mameyita were superior a quality to all others. They were rather closely followed ay a 2d group made up of Big Stem Jersey, Yellow Jersey, Porto Rico, Yellow Strasburg, and Red Bermuda. A 3d

group, graded good in quality, consisted of Red Jersey, Early Red Carolina, Vineland Bush, Gold Skin, Creola, Dooley, Key West "yam," Pumpkin "yam," and Vineless Pumpkin "yam." A 4th group made quite acceptable products which were graded fair in quality; it consisted of Florida, Norton, Red Brazil, Triumph, and Southern Queen and its strains, Ballinger Pride and Miles "yam." A given var. shows the same general level of quality, whether baked fresh, canned, or dried; and of the groups and subgroups into which American sweet notatoes are subdivided groups into which American sweet potatoes are subdivided, the Jersey and Pumpkin groups and the Bermuda section of the Spanish group are quite consistently high in quality, while the Belmont and Southern Queen groups are as con-

sistently low or mediocre.—Auth. summ.

1179. CARRERAS, G., J. La nomenclatura de las modernas variedades de caña de azúcar. [The nomenclature of modern vars. of sugar cane.] Agronomia [Molina] 3(11):

7-14, 1938.

1180. CASHMORE, A. B., and K. G. CARN. Skeleton weed, Chondrilla juncea L. Experiments with weed-killers. Jour. Counc. Sci. and Industr. Res. Australia 11(1): 21-29.

1181. CIFERRI, E. Note pratiche sulla cultura dell' 1181. CIFERRI, E. Note pratiche sulla cultura dell' "arrow root" (Maranta arundinacea) e sull'estrazione dell'-amido. Agric. Colon. [Florence] 32(8): 359-367. 1938. 1182. CLARK, J. ALLEN. Registration of improved wheat varieties. XII. Jour. Amer. Soc. Agron. 30(12): 1037-1043. 1938.—3 vars. of wheat, Nebred, Pilot, and Thorne, were registered in 1938.—J. A. Clark. 1183. CLARKE, M. F. The nitrogen distribution in alfalfa hay cut at different stages of growth. Canadian Jour.

falfa hay cut at different stages of growth. Canadian Jour. Res. Sect. C. Bot. Sci. 16(9): 339-346. 1938.—Analyses were made of alfalfa hays cut at 6 stages of growth during 1 growing season. For the determination of the soluble forms of N, the method developed by Wasteneys and Borsook for fractional analysis of incomplete protein hydrolysates was used. This procedure ensured the securing of more definite information concerning the exact gradations of protein synthesis and breakdown than is obtained by the usual amino and amide N detns. The data for total N show a steady decrease with advancing maturity of the harvested material. Also, the 2d and 3d cuttings of hay exhibit a higher total N content than the 1st cutting. Total soluble N fluctuates throughout the growing period. Cuts made later in the season show a progressive decrease in the proportionate amts. of this fraction. In all cuttings, total soluble N tends to be present in large amts. during the early part of flowering.—The results obtained give a clear picture of protein synthesis and degradation throughout the growing period, strengthening the assumption that the period between bud formation and the commencement of flowering represents a critical stage in the life history of the plant. Auth. abst.

1184. DODDS, H. H. The revolution in sugar-cane varieties in South Africa. So. African Sugar Yearbk. 1938(9):

91-107. 1938.

1185. ERGLE, D. R., L. E. HESSLER, and J. E. ADAMS. Carbohydrates of the cotton plant under different seasonal conditions and fertilizer treatment. Jour. Amer. Soc. Agron. 30(11): 951-959. 1938.—Cotton plants were grown on Houston black clay and Wilson fine sandy loam soils of the Blackland prairie section of Texas. Analyses of whole plants taken at 9 dates during the 1936 season showed that (1) the general level of carbohydrates was higher under the drought conditions for the Wilson soil than for normal on the Houston; and (2) the monosaccharide, disaccharide, and polysaccharide contents were affected by fertilizers applied to the Wilson, while only the polysaccharide content was materially affected by fertilizers on the Houston soil. Analyses of whole plants (tops and roots composited) do not reflect the effect of fertilizer treatment as well as root

and aerial segregates studied previously.—J. E. Adams.
1186. FRANÇOIS, L. Dissemination des plantes adventices. Ann. Agron. 8(5): 699-706. 1938.—Weeds are like most of the cultivated crop plants in that they would tend to quickly disappear if man ceased cropping the earth's surface. Possessed of divers mechanisms of dissemination and dispersed by many agencies, it may safely be said that mankind is the chief agency causing the spread of weeds.

R. R. McKibbin.

1187. FUJII, M., and M. NISHIOEDA. An investigation on the sensibility of the sugar cane to the sunshine. [In Jap. with Eng. summ. Rep. Gov't Sugar Exp. Sta. Tawain.

Formosa 5: 47-52. 1938.

1188. GREGORY, F. G., and O. N. PURVIS. Studies in vernalisation of cereals. III. The use of anaerobic conditions in the analysis of the vernalising effect of low temperature during germination. Ann. Bot. 2(7): 753-764. 1 pl., 3 fig. 1938.—Two effects of low temperature germination are considered: mere delay in germination, and the specific vernalizing effect. These were experimentally separated by using anaerobic conditions and high concs. of CO2 as a means of prolonging germination at high temp. Plants of winter rye and wheat, and of spring rye grew to maturity after a maximum exposure of 3 weeks in N at 20°C and 12 weeks at 1°C. Anaerobic conditions resulted in "devernalization" of spring rye with increase in leaf number and delay in anthesis. Spring rye previously devernalized by anaerobic conditions could again be revernalized by low temp., giving it a normal leaf number and a normal time to anthesis. Anaerobic conditions completely prevent vernalization even after 12 weeks at 1°C. The tension of O₂ required for complete vernalization is greater than 1/500 normal, though at this level considerable vernalization occurs. The specific effect of low temp. was proved by exposing imbibed grain alternately to air at 1°C and N at 20°C. Equal daily exposures for 12 weeks gave plants indistinguishable from unvernalized; controls with similar alternations of air and N kept at 1°C were completely vernalized. Alternations of 6 days at 1°C in air followed by one day at 20°C in N (total time in air at 1°C 6 weeks) gave completely vernalized plants. Using the same total period of low temp., intermediate values were obtained with different relative durations at the 2 temps., and a linear relation was found between time to anthesis and total duration at 20°C. High temps. bring about quantitative reversal of the low-temp. effect and the specific nature of the action of low temp. is proved.—F. G. Gregory.

1189. HANCOCK, N. I. A new method of delinting cotton-seed with sulfuric acid. *Tennessee Agric. Exp. Sta. Circ.* 61, 1-8, 6 fig. 1938.—The construction of an inexpensive seeddelinting drum is descr. with advice on its operation, planting rates, and advantages and disadvantages of acid-delinted seed. Such seed usually germinated faster than fuzzy seed, and gave almost perfect stands.—H. M. Steece (courtesy Exp.

Sta. Rec.).

1190. HARDENBURG, E. V. Potato tuber bruising in the Cleveland and Rochester markets. Amer. Potato Jour. 15 (8): 213-219. 1938.—Over 500 samples of potatoes each weighing about 15 pounds were taken in retail stores in Cleveland and Rochester for grade analysis during 1936 and 1937. As part of a larger study of consumer preference, these samples were graded according to U.S. grade standards and analyzed for all defects including bruises. 6.11% (by weight) were damaged, 2.21% seriously damaged, from bruising. Bruising damage represented 38.6% of total damage. A significantly higher % of damage from bruising was found in potatoes handled by chain stores than in those handled by fruit and vegetable stores, independent groceries and insti-tutions, due probably to the fact that chain stores buy mostly in carlots which involves more handling than when potatoes are bought directly from farmers and truckers. Green Mountains are much more susceptible to bruising than any other var. studied; Russet Rural evidenced more bruising than white Rurals. To determine the actual increase in bruising from the time potatoes are unloaded from freight cars in Cleveland until they are offered to the public in retail stores, 58 thirty-pound samples were analyzed and tagged in several cars and later similarly analyzed in the various stores to which they were delivered. Damage from bruising increased from 2.93% to 9.38%, serious damage increased from 0.97% to 3.31%. Here again Green Mountain showed a much greater susceptibility to bruising than White Rural, Chippewa and Katahdin receiving the same type of handling. Both Chippewa and Katahdin carried less bruising damage than White Rural.—E. V. Hardenburg.

1191. HENSEL, R. L. Perfect-flowered buffalo grass (Buchloe dactyloides). Jour. Amer. Soc. Agron. 30(12):

1043-1044, 2 fig. 1938.

1192. KENJO, M. On the water-culture experiments with

sugar cane 4. The phosphorus deficiency experiment. [In Jap. with Eng. summ.] Rep. Gov't Sugar Exp. Sta. Tawain,

Formosa 5: 31-44. 4 pl. 1938. 1193. MOOERS, C. A. Clovers and grasses for hay and pasture. Tennessee Agric. Exp. Sta. Bull. 165. 1-71. 17 fig. 1938.—The characteristics, cultural and fertility requirements, utilization for hay, pasture, soil improvement, or as a seed crop, and their relative merits are shown for true clovers, lespedezas, alfalfa and other Medicagos, and native and introduced grasses grown or tested by the station. Clover-and-grass mixtures are indicated for temporary and permanent pastures and for meadows. Information also is included on pasture management, grazing of seasonal and permanent pastures, and on meadow and pasture weeds and

their control.—H. M. Steece (courtesy of Exp. Sta. Rec.). 1194. NOVIKOVA, N. G. Osoka kak syr'e dla proizvodstva bumagi. [Sedges as materials for paper making.] [In Russ.] Sovetskaia Botanika [Soviet Botany] [Leningrad]

1937(6): 134-139. Illus. 1938.

1195. OLSON, T. M., and T. A. EVANS. Ten years of experimental results on cultivated pastures. So. Dakota Agric. Exp. Sta. Bull. 324. 1-16. 1 fig. 1938.—Ten years' results on the returns secured from grazing alfalfa, sweet clover, and Sudan grass with milking cows are summarized. The length of the grazing season ranged from 40 to 98 days, with an average of 67.4 for alfalfa; 20 to 109, with an average of 67.8 for sweet clover; and 20 to 89 with an average of 51 days for Sudan grass. These averages are considered abnormally low because of several extremely dry seasons encountered. The average amount of milk and butterfat produced per acre of pasture was 3,669 and 146.7, 3,308 and 135.5, and 2,767 and 110 lbs. for sweet clover, alfalfa, and Sudan grass, respectively. In general little trouble was experienced with bloat, with greatest danger occurring when legumes were growing rapidly. Sudan grass was most palatable, followed in order by alfalfa and sweet clover. None of these plants had a deleterious effect on milk flavor when the cows were removed from pasture from 2.5 to 3 hrs.

when the cows were removed from pasture from 2.5 to 3 hrs. before milking.—E. C. Elting (courtesy Exp. Sta. Rec.).

1196. PARHAM, B. E. V. The history and distribution of Solanum torvum Swartz in Fiji with notes on the possibility of its control. Agric. Jour. [Fiji] 9(3): 2-5. 1938.

1197. PARHAM, B. E. V. Notes on weeds in Fiji. L. Piper aduncum Linn. Agric. Jour. [Fiji] 9(3): 12. 1938.

1198. ROBINSON, W. O. The agricultural significance of the minor elements. Amer. Fertilizer 89(8): 5-8, 24, 26.

1199. SALLANS, HENRY R., and J. ANSEL ANDERSON. Varietal differences in barleys and malts. II. Saccharifying activities of barleys and malts and the correlations between them. Canadian Jour. Res. Sect. C Bot. Sci. 16(10): 405-416. 1938.—Determinations of free and total saccharifying activity were made on 144 samples of barley, and free saccharifying activity (Lintner value) was also detd. on kilned malts made from these barleys. The samples represent 12 vars. of barley grown at 12 widely separated exptl. sta-tions in Canada. Varietal differences were demonstrated with respect to each determination. In total barley activity and malt activity, Olli was outstandingly high; the remaining 6-rowed rough-awned vars., Pontiac, Mensury Ott. 60, O.A.C. 21, and Peatland, and the smooth-awned var. Velvet, also yielded high values; the 2-rowed var. Hannchen gave intermediate values; and the 2-rowed vars., Victory and Charlottetown 80, and the remaining smooth-awned 6-rowed vars., Nobarb, Wisconsin 38, and particularly Regal, were low in activity. With respect to free barley activity the vars. fell in the same order with the exception of Olli, Peatland and Charlottetown 80 which gave low values. These 3 vars. have only about 22% of total barley amylase in free form; figures for the other 9 vars. range between 38 and 44%. There is a close correlation (r=0.997) between total barley activity as measured by the papain and H₂S methods, the former giving higher values. Vars. that are high in total barley activity also tend to be high in malt activity (papain, r=0.904; H_2S , r=0.868). A similar relation exists between free barley activity and malt activity for 9 of the vars. ($\tau = 0.971$), but if the 3 vars, having low percentages of free amylase are included the correlation is not significant (r=0.217). Environment affects each property in essentially the same manner so that mean values for the different stations fall

in much the same order for each determination and correlation coefficients for station means are all high. The possible utility of determinations of total barley saccharifying activity for facilitating the selection of strains of good malting quality from collections of hybrid lines is discussed. -Auth. abst.

1200. SALMON, S. C. Unbalanced arrangement of plats in Latin squares. Jour. Amer. Soc. Agron. 30(11): 947-950. 1 fig. 1938.—In restricted random arrangements of Latin squares certain unbalanced and undesirable arrangements occur more frequently than in fully randomized Latin squares; these may be avoided by systematic distribution of plats.—S. C. Salmon.

1201. SAMUEL, P. La culture du maïs aux Pays-Bas.

[Corn raising in Netherlands.] Ann. Gembloux 44(6): 188-

194. 1938.

1202. SCURTI, F., i G. L. PAVARINO. Sulle transformazioni che l'erba medica subisce nella fienagione in confronto con lo stesso prodotto conservato nei silos albesi e nei silos finlandesi. [The changes in alfalfa hay in comparison with the same product preserved in limestone silos and in Finnish silos. 7 Ann. Sperim. Agrar. [Rome] 29: 69-74. 1938.—Comparative structural studies of changes of the veins, midribs,

laminar tissues and stems, shown by drawings.—F. A. Wolf. 1203. SPRAGUE, V. G., and L. F. GRABER. The utilization of water by alfalfa (Medicago sativa) and by bluegrass (Poa pratensis) in relation to managerial treatments. Jour. Amer. Soc. Agron. 30(12): 986-997. 1938.—A comparative study of the water utilization of alfalfa (Medicago sativa) and Kentucky bluegrass (Poa pratensis) was conducted under greenhouse conditions of favorable soil moisture, and under frequent and deferred cutting treatments, with and without N fertilization. The daily rate of water utilization was low in the vegetative stages of growth, but increased rapidly as the plants approached maturity. With weekly clippings, which maintained a vegetative state of growth the daily rate was low and the total amount of water utilized during a given period was much less. When growth was retarded by reductions in the food reserves due to clipping treatments, or by N deficiencies, the water requirement was greatly increased. While early cutting of alfalfa and close, early grazing of bluegrass may conserve soil moisture, they are not recommended as antidotes for dry weather, but rather to explain, in part, field responses they produce.-V. G. Sprague.

1204. STANELY, E. B., and C. W. HODGSON. Seasonal changes in the chemical composition of some important Arizona range grasses. Arizona Agric. Exp. Sta. Tech. Bull. 73, 449-466. 10 fig. 1938.—Seasonal changes in the composition of blue grama (Bouteloua gracilis), hairy grama (B. hirsuta), and curly mesquite (Hilaria belangeri) grasses were detd. on samples collected at from 10- to 14-day intervals from early Aug. (after new growth had started) to Nov. (when the plants were mature and dry) and at monthly intervals during the winter season. The data are presented in graphic form. The moisture, crude protein, and phosphorus were high in he young plants but steadily declined to a minimum when he plants were mature. Total ash and ether extract failed o show definite trends. N-free extract and lignin steadily ncreased from early growth stages to maturity, while crude ber rose rapidly during early growth and was variable hereafter. Ca was high in young plants, low during the rinter, varied during the intervening period. Digestibility nd palatability which were high in young plants decreased o low values as the plants became mature and dry.—E. C.

Iting (courtesy Exp. Sta. Rec.).

1205. STANTON, T. R., H. C. MURPHY, F. A. COFF-IAN, L. C. BURNETT, and H. B. HUMPHREY. New disase-resistant early oats from a Victoria-Richland cross. our. Amer. Soc. Agron. 30(12): 998-1009. 1938.—Victoria, stroduced from Uruguay in 1937, is highly resistant to crown ast and also to the smuts of oats. It has been crossed on rany commercial vars. to develop vars. with high resistance these diseases. However, this paper reports results only om a cross between Victoria and Richland, the latter a ighly productive, early oat with high resistance to stem ast and of much commercial importance. Numerous elections are now available with resistance to crown rust, em rust, and the oat smuts that in tests in Iowa and other orn-Belt States show high yielding power and high test

weight. They appear to be superior to the standard Iogold and Richland vars. in yield and quality, even where rust and smut are not limiting factors. Their greater tolerance of heat and drought, or better adaptation, and apparent resistance to the attacks of soil-borne organisms and minor diseases, may be factors that play an important rôle in the promising behavior of these new hybrid oats. One or more of these selections probably will be named and distributed to Corn-Belt farmers within the next few years, provided hitherto unimportant races of the oat rusts and smuts do not spread and attack them. Indications are that their culture should materially increase the productiveness of oats

in the Corn Belt.—T. R. Stanton.

1206. STANTON, T. R. Registration of varieties and strains of cats. VIII. Jour. Amer. Soc. Agron. 30(12): 1030-1036. 1938.—The registration of 3 improved vars. of cats, cats. viz., Fulton, Carleton, and Bannock, by the Amer. Soc. of Agronomy and the Bureau of Plant Industry, cooperating, is reported. Fulton was originated from a cross between Fulghum and Markton. Its superior characters are earliness, high yield, and resistance to smut. Carleton was originated as a selection from a Markton x Sixty-Day cross. Its superior characters are resistance to smut and Fusarium culmorum, high yield, early maturity, and adaptation to dry-land conditions. Bannock, a midseason variety, was originated from a cross between Markton and Victory. Its superior characters are resistance to smut, high yield and

quality.—T. R. Stanton.

1207. STEHLÉ, H. Les légumineuses améliorantes aux Antilles françaises. Agron. Colon. [Paris] 27(248): 33-45.

1208. TAYLOR, J. W., and F. A. COFFMAN. Effects of vernalization on certain varieties of oats. Jour. Amer. Soc. Agron. 30(12): 1010-1019. 2 fig. 1938.—Vernalization of oat winter Turf, Fulghum (C. I. 708), Fulghum (C. I. 2499), Frazier, and Nortex. The average time elapsing from seeding to heading was shortened by 6 days for these vars. in tests conducted during a 5-year period. Conversely, heading in the spring oat vars. Iogold, Richland, and Silvermine not only was not hastened but vernalization actually retarded heading of logold in some years. Frazier, Nortex, and Fulghum (C. I. 2499) produced higher average yields from vernalized than from untreated seed; Lee, Fulghum (C. I. 708), and the spring oat logold produced less. Early sown spring oats outyielded vernalized oats and fall-sown oats outyielded the highest yielding vernalized var. by some 20%. Vernalization greatly reduced occurrence of smut. In a 3year test 4.6% of the panicles per row of Iogold sown from untreated seed were smutted, whereas but one smutted panicle occurred in 3 years among plants in rows produced from vernalized seed.—Authors.
1209. THOMAS, B., and F. C. THOMPSON. The effect of

manurial treatment on the changes in composition which occur during haymaking. Chem. and Indust. [London] 57 (6): 209-211. 1938.

1210. TOPACIO, DEMOCRITO. Determination of the fertilizers and fertilizer mixtures suitable for an upland

rice. Philippine Agric. 27(6): 471-494. 4 fig. 1938.
1211. TUSSING, E. B. Some cultural factors affecting the grade of Ohio potatoes. Ann. Rept. Vegetable Growers Assoc. Amer. 1938: 154-166. 1938.—Certified seed and seed one year from certification produce substantially higher yields than other seed. When the amt. of seed planted exceeded 25 bushels per acre, the yields increased markedly. Yields from potatoes planted not later than June 15 were much higher than from fields planted after that date. Substantially higher yields, on the average, resulted where potatoes were sprayed. Cuts and bruises caused by diggers were responsible for a loss of more than 5% in these

samples in 1936 and almost 4% in 1937.—H. B. Brown.
1212. WILLARD, C. J. The rate of seeding Grimm and 1212. WILLARD, C. J. The rate or seeding Gilmm and common alfalfa. Ohio Agric. Exp. Sta. Bimonthly Bull. 23(195): 181-195. 3 fig. 1938.—5 years' results from 4 seedings of alfalfa on Brookston clay in NW Ohio at rates ranging from 2½ to 50 pounds per acre are discussed. There was no increase in yield for rates of seeding over 7½ lbs. per acre, no significant difference in the most desirable rate of seeding. Grimm and common alfalfa, no significant differences in the percentage of leaves or the percentage of protein in the hay

from different rates of seeding, although the stems from the thick rates were much finer, and no significant difference in the weight of air-dry roots per acre for rates of seeding over 12½ pounds per acre. Drilling did not consistently give satisfactory stands at lower rates of seeding than broad-casting.—C. J. Willard.

1213. WOODRUFF, SYBIL, EVELYN CHAMBERS, and

HELEN KLAAS. A study of protein extract from soybeans with reference to its use in food. Jour. Agric. Res. 57(10): 737-746. 2 pl. 1938.—Protein was extracted from 2 vars. of soybeans and from commercial soybean flakes by treating fat-free finely ground beans with water at room temp, and then precipitating the protein from the extract by acidification with acetic acid to pH 5. The dried protein substance thus obtained represented about 52.6% of the N originally present in the soybeans. It was 92% protein $(N \times 5.71)$ on a moisture-free basis. The protein was not crystalline but appeared to be anisotropic. Photomicrographs show its luminous appearance between crossed Nicols and also show it in the process of precipitating and peptizing. It was not measurably soluble in water or salt soln., though acetic acid and Na₂CO₃ solns. caused it to soften and swell. Suspensions of it did not foam; in this behavior it differed markedly from suspensions of ground fat-free soybeans, the foaming ability of which is probably due partly to nonprotein constituents. The protein substance did not produce a thickening or binding of food ingredients similar to the effect caused by egg proteins in custards or muffins. It might be incorporated in many food dishes to add to their protein content. It may offer possibilities as a new source of food protein, and have the advantage over soybean flour of higher protein content and freedom from flavor.—S. Woodruff.
1214. YAMASAKI, M., and T. TAKESHITA. Studies of

the germination of sugar cane cuttings with special reference to the root emergence. [In Jap. with Eng. summ.] Rept. Gov't Sugar Exp. Sta. Tawain, Formosa 5: 1-20.7 pl.

1938.

SOIL SCIENCE (EDAPHOLOGY)

1215. BEATER, B. E. The movement and fixation of superphosphate in soils. Soil Sci. 46(6): 453-466. 1938. 1216. EMMERT, E. M. Rapid determination of organic carbon in soil. Soil Sci. 46(5): 397-400. 1938.

1217. HIGBEE, HOWARD WILLIAM, R. R. FINLEY, R. S. LONG, and J. C. BRYANT. Soil survey of Franklin County, Pennsylvania. U. S. Dept. Agric. Bur. Chem. and

Soils 1932(31): 1-92. Map, 4 pl., 1 fig. 1938. 1218. LEEPER, G. W. Organic matter of soil as determined by climate. Jour. Australian Inst. Agric. Sci. 4(3):

145-147. 1938.

1219. LESH, F. R., W. J. GEIB, A. E. SHEARIN, and C. H. WONSER. Soil survey of Edgefield County, South Carolina. 1935(1): 1-56. Map, 1 fig. 1938.

1220. MILLER, JOHN T., and IRVIN C. BROWN. Observations regarding soils of northern and central Mexico. Soil Sci. 46(6): 427-450. 1 pl. 1938.

1221. PRINCE, A. L., S. J. TOTH, and A. W. BLAIR. The chemical composition of soil from cultivated land and from land abandoned to grass and weeds. Soil Sci. 46 (5): 379-389. 2 fig. 1938.—After a period of 30 years land abandoned to grass and weeds shows definite gains in N and C, while the soil of adjacent plots under a 5-year rotation of corn, oats, wheat, and 2 years of timothy shows gradual depletion. Subsurface soils of the uncultivated section show higher percentages of these elements than do those of the cultivated section. In the uncultivated section, the pH values increased progressively with each 2-inch increase in depth down to 6 inches; and the total N, C, and P decreased progressively. Much of the P is fixed in the top 2-inch layer. The larger amts, of other constituents in this layer are due largely to accumulation of organic matter. The cation exchange capacity of the uncultivated soils, greatest in the top 2 inches, was higher than in the cultivated soils, because of the accumulation of the acidoid fraction. The effect of leaching and of removal of exchangeable bases by cultivation is reflected in the lower amt. of exchangeable Ca, Mg, and K in the cultivated than in the uncultivated soils.—A. L. Prince.

1222. PURI, AMAR NATH, and H. L. UPPAL. Action of carbon dioxide on soils. Soil Sci. 46(6): 467-471. 1938.

1223. SWEET, A. T., W. J. LATIMER, C. S. PEARSON, C. H. DIEBOLD, W. W. RIETZ, C. P. MEAD, WILBER SECOR, and MONTAGUE HOWARD, Jr. Soil survey of Monroe County, New York. U. S. Dept. Agric. Bur. Chem. and Soils 1933(17): 1-67. 3 maps, 2 pl., 1 fig. 1938.

HORTICULTURE

F. C. BRADFORD, Editor

(See also in this issue Entries 85, 110, 263, 779, 1021, 1117, 1141, 1172, 1181, 1198, 1286, 1354, 1361, 1369, 1373, 1376, 1390, 1411, 1437, 1446, 1472, 1495)

1224. ANGELO, ERNEST. Experiences in propagating Rubus and other species by leaf-bud cuttings. Proc. Amer. Soc. Hort. Sci. 35: 448-450. 1937(1938).—Selected black raspberry seedlings were propagated by using leaf-bud cuttings placed in sharp sand as a rooting medium. Leaves from the central part of the cane were found most satisfactory. A rather thick and long (4-inch) heel proved best. Cuttings made from July 22d until Sept. 22d rooted readily. The plants grown in Sept. took a different form from those grown earlier. A definite rosette type of plant was developed. Leaf-bud cuttings of purple-cane raspberry, Prunus japonica, P. tomentosa, rose, mock orange and gooseberry were rooted. - $E.\ Angelo.$

1225. ARTHUR, JOHN M., and EDWARD K. HARVILL. Heating and lighting greenhouses with intermittent light. Contrib. Boyce Thompson Inst. 10(1): 15-44. 1938.—A study of the growth and flowering of many plants in 2 types of greenhouses equipped for supplemental light at night. In one type, the heat insulated house, 500-watt tungsten lamps furnished the sole source of both heat and light; in the other, conventional type house, a part of the heating load was carried by a thermostatically controlled steam heating system. The same amount of light (average 3.4 hours per 24-hour day) was applied to both houses. Dry weight production and flowering were greatly increased in both lighted houses as compared with controls without additional light, but dry weight production was less in the insulated house due to restricted CO2 supply resulting from a lower rate of air exchange. Three sources for supplying CO2 were usedlumps of solid CO₂, cylinders of gas, and cages of fowls. Hyacinths were brought into flower in 2- to 4-week's exposure to light after a preliminary treatment of 3 months in a dark room at 50° F. Easter lilies were brought into flower for Christmas from bulbs planted Sept. 17 and a 2d crop planted Jan. 3 was in flower the latter part of Mar. Sup-lementary lighting increases the height growth of lilies; higher temps. decreased the time from planting to flowering. Both common garden vars. and large flowering types of gladiolus were brought into flower in late Jan. and Feb. from bulbs planted Oct. 5. With current at 2 cents per k.w., the total cost per flower spike for gladiolus is approximately 5 cents if this method of lighting is continued until the

last of Jan.—J. M. Arthur.
1226. BARNARD, C. Studies of growth and fruit bud formation. VI. A summary of observations during the seasons 1930/31 to 1934/35. Jour. Counc. Sci. and Indust. Res. Australia 11(1): 61-70. 1938.

1227. BEEBE, N. P. Gardening in Russia and the Scandinavian countries. Ann. Rept. Vegetable Growers Assoc. Amer. 1938: 68-71. 1938.—Vars. of vegetables grown in the Scandinavian countries are the same as those grown in the U.S. and the quality is as good. In Russia collective farms are leased by the government for a certain percent of the crops to a group of individuals. Every 2 years the workers elect a board of directors who elect a manager. Workers are paid according to the day's work done and the % of sales from the farm.—H. D. Brown.

1228. BIEBEL, J. P. The present status of growing

vegetables in nutrient solutions. Ann. Rept. Vegetable Growers Assoc. Amer. 1938: 101-111. 1938.—One type of nutrient soln. culture method consists of suspending the plants on a network, the roots being submerged in a shallow tank of nutrient soln.; in the other type the plants are grown in a porous medium which is kept moistened with the nutrient solution. Nutrient soln. must supply the following ions to maintain good growth; ammonium, nitrate, K, phosphate, Ca, Mg, sulfate, Fe, Mn, Cu, B, and Zn. The yield of tomatoes is slightly higher in nutrient soln. plots than soil plots. Heating the nutrient soin, brings the crop in slightly earlier. The chief advantages of nutrient soln, method are increased control of mineral uptake of crop, decrease in costs due to elimination of labor required in watering and cultivation, and a reduction of the amount of fertilizers required.—H. D. Brown.

1229. BLACKMON, G. H. Does annual fertilization in a pecan orchard pay? Proc. Ann. Convention Southeastern Pecan Growers Assoc. 31: 20-32. 1937.

1230. BLACKMON, G. H. Florida pecan experiments. Proc. Ann. Convention Southeastern Pecan Growers Assoc. 12: 14-16, 18-23, 1938.

1231. CARDINELL, H. A. Observations on certain coatngs used in grafting the apple. Quart. Bull. Michigan Agric. Exp. Sta. 21(2): 123-129. 5 fig. 1938.

1232. CARNE, W. M., and D. MARTIN. The statistical elation of crop size to the incidence of storage disorders apples and to their chemical and physical characters. Results obtained in 1936 and 1937. Jour. Counc. Sci. nd Industr. Res. Australia 11(1): 83-86, 1938.

1233. CHRISTOPHER, E. P., and VLADIMIR SHUTAK, he influence of spacing strawberry plants on yield. Proc. mer. Soc. Hort. Sci. 35: 501-503. 1937(1938).—For a water tentive soil, matted rows of Howard 17 and Dorsett rawberries yielded about the same whether the mother lants were set 18, 24, 30, or 36 inches apart. When the inner plants were spaced 5 to 10 ins. apart the yields were creased over the matted row when the mother plants were t 18 and 30 ins, apart. With mother plants set 24 ins, apart, the 6-in, spacing yielded more than the matted row plants to the greater spacing did not yield appreciably more. In the basis of these tests, spacing runner plants 6 to 7 ins. part was best.—George M. Darrow.

1234. COMIN, DONALD. Irrigating muck crops in Ohio.

m. Rept. Vegetable Growers Assoc. Amer. 1938: 138-148. 38.—The overhead system of irrigation provides the ideal sthod of water application for all types of vegetables. ie use of an evaporative index calculated from atmometer idings supplies information useful in determining how ich water to apply. When irrigation, plus rainfall equal twice the amount lost by evaporation, was applied the lowing yield increases were obtained during a dry season; ly celery, 306%; early cabbage, 60%; late cabbage, 81%; ets, 47%; carrots, 50%; and potatoes, 57%.—H. D. Brown.

235. DALMASSO, G., e M. VENEZZIA. Il controllo grado di maturita della uve da tavola e l'applicazione iffractometro. R. Staz. Sperim. Viticolt. e Enol. negliano Ann. 7: 339-384. 1936-1937.—The difficulty of ablishing a Standard of Maturity for table grapes is dained and a review of the work done along those lines in nce, Algeria, California, Cape Colony, Italy, etc., is given. a authors recommend the use of the Zeiss refractometer ause of its simplicity, accuracy and rapidity and the ill amount necessary for a test. In Germany the ratio gree Œchsle/Degree refractometer is about 4.25; in y it is closer to 4.73. As the ratio, Œchsle/Sugar is 5, I easy to pass from one to another. The reading of the actometer comes close to the actual sugar contents by ling detn. The ratio refractometer reading/total acid s a good idea of the coefficient of maturity.—E. H.

236. DAWIS, VICENTE M. Variability among Anrium plants produced from seeds. Philippine Agric, 27: 495-501, 4 fig. 1938.

237. DICKSON, GEORGE H. Some results of mineral liners on apple seedlings. Sci. Agric. [Ottawa] 19(2): 109. 2 fig. 1938.—Severe leaf scorch was evident in cerareas of a newly planted seedling apple orchard. An ication of KCI placed in contact with the roots soon

resulted in marked improvement in the condition of the foliage. Some other areas in the orchard showed little leaf scorch even though the replaceable K was equally low. A possible explanation of the difference lies in the physical condition of the soil in the 2 areas, shallow rooting due to impervious layers being the primary cause of the leaf scorch.

-W. H. Upshall.

1238. ELLIS, N. K. Growing vegetables on muck in Indiana. Ann. Rept. Vegetable Growers Assoc. Amer. 1938: 149-154. 1938.—To protect the muck from wind erosion during the winter, potato and onion growers should sow rye as soon as the crop is removed. Fertilizer should be high in potash, the best treatment being about 750 lbs. of 0-8-24 fertilizer applied on either side of the row. Golden Cross Bantam, Purgold or Indigold sweet corn give the most consistent high yields and fine quality ear. Tonnage of carrots will increase with increased amounts of fertilizer

if the weather does not interfere.-H. D. Brown.

1239. GUISCAFRÉ-ARRILLAGA, J., and LUIS A. GÓMEZ. Studies of the root system of Coffea arabica L. I. Environmental condition affecting the distribution of coffee roots in Coloso Clay. Jour. Agric. Univ. Puerto Rico 22(2): 227-262. 5 pl. 1938.—The methods used by Gómez, Lee, Lee and Bissinger, Nutman, Trench, Venkatraman, and Weaver et al. in the study of the root system of plants are discussed. A new method is described, which was used for the study of the root system of coffee in Puerto Rico; it consists in excavating the volume of soil assigned to each tree under study by blocks of 1 cu. ft. each and separating, drying and weighing the roots obtained from each block. By keeping an excavation map for the root system of the trees, the exact position of roots obtained for each block is obtained; the quantity of roots present at the various soil levels, and the lateral spread of the roots, can thus be detd. 94% of the roots of all trees were found in the uppermost foot of soil; this is probably due to the high percentage of organic matter in Coloso Clay, especially in the uppermost layers, and the better aeration at the surface. The imperfect drainage conditions existing at localities where Coloso Clay predominates affect the development of the root systems of coffee. Coloso Clay is a productive soil where proper drainage is provided and the principal plant foods are generally distributed uniformly to a depth of 48 ins. A heavy and vigorous coffee tree top is not dependent on an extensive root system. There is no fixed tops/roots ratio in coffee trees, but generally this ratio may be taken to be 8:1. In selecting trees with vigorous, heavy tops and a strong, extensive root system, the diam. of the trunk is a better indication of the possession of these characteristics than either the height or the lateral spread of the tree. There was approx. 50% of water in the upright stems of coffee trees, 23% in the lateral branches and leaves, 39% in the whole tree tops and 50% in the roots. The absorbing area of the root system is not confined to definite places on the soil but is distributed throughout all places penetrated by the main and secondary roots. The vertical penetration of roots of 7-year-old trees is 3 feet and the lateral extension is 4 feet. The results obtained are discussed in relation to possible applications in practices followed by farmers in coffee plantations.—Auth. summ.

1240. HARMER, PAUL. The production of vegetable crops on Michigan's muck soils. Ann. Rept. Vegetable Growers Assoc. Amer. 1938: 184-189. 1938.—Wind injury is prevented by planting trees, erection of fences, use of interplanted crops, and maintaining as high a water level in the soil as is possible with the crop being produced. Frost damage can be avoided by growing crops which are not easily frozen. The varieties of the crops which are well suited to muck are recommended. Fertilizer with more K than P is needed on muck.—H. D. Brown.

1241. HARWOOD, L. W. Native food crops of Fiji. Agric. Jour. [Fiji] 9(3): 8-11. 1938.—Dalo or taro (Colocasia antiquorum esculentum), yam (Dioscorea sp.), cassava (Manihot sp.) and breadfruit (Artocarpus incisa) are dis-

cussed.—Courtesy Plant Sci. Literature.

1242. HAVIS, LEON. Seedless peaches as a result of freezing injury. Ohio Agric. Exp. Sta. Bimonthly Bull. 23 (195): 214-219.3 fig. 1938.—Observations on the development of peaches following destruction of the seeds by frost on May 12. 1938, are presented. The seedless peaches were borne mainly on young trees that retained only a few fruits after the freeze. There seemed to be no difference between the time of ripening of the fruits containing dead seed and those in which the seeds were well developed. There was a lower % of dead seed in the fruits reaching the largest sizes, but many of the largest ones contained destroyed seed. -L. Havis.

1243. HILGEMAN, R. H., and J. G. SMITH. Maturation and storage studies with soft varieties of dates. Rept. Date Growers' Inst. 15: 14-17. 1937(1938).—Several vars. of dates were kept at 140°-176° F for periods of 1-7 hours and at regular commercial processing temps. of 90°-120° F for 12-48 hrs., then wrapped in ordinary and moisture-proof cellophane and stored at 32° and 5° F. In general, the high heat treatments produced dates inferior to those commercially processed at lower temps. Moisture-proof cellophane practically eliminated loss of moisture and consequent crystallization of sugar but greatly accelerated darkening and deterioration in grade and flavor. Preliminary data would indicate that the storage temp. of 5° F maintains a better grade of fruit for longer periods than does 32° F .-Authors.

1244. HODGSON, R. W., and E. R. EGGERS. Rootstock influence on the composition of citrus fruits. California Citrograph 23(12): 499, 531. 1938.—These studies are based on individual trees of each var.—rootstock combination but their uniform trend and agreement with other similar tests give strength to their results. Washington Navel and Valencia oranges, Eureka and Lisbon lemons, Marsh grapefruit and Bearss lime were tested on sweet, sour and tri-foliate orange, rough lemon and grapefruit rootstocks. Trifoliate orange, the most dwarfing stock, produced the highest soluble solids content in all vars., and rough lemon, the most vigorous stock, gave the lowest soluble solids content. Rough lemon rootstock also produced the lowest acid content in the fruit juices and the tendency for trifoliate orange to produce high acid content was marked. These 2 rootstocks were approx. equally effective in producing high soluble solids-to-acid ratios in the fruit juices.— C. S. Pomeroy.

1245. HOFFMAN, I. C. Present cultural methods in growing the spring greenhouse tomato crop in Ohio. Ann. Rept. Vegetable Growers Assoc. Amer. 1938: 88-100. 1938 .-Globe is the leading greenhouse tomato var. in Ohio. There is little difference in crop producing power of different types of soil when properly managed. Steam sterilization at 140° F for a few hours will kill nematodes and insects, and 180° F for 6-8 hours controls Fusarium wilt. The present recommendations of fertilizer quantities are: superpresent recommendations of fertilizer quantities are: superphosphate, 1,000 to 1,500 pounds per acre; muriate of potash, 750 to 1,000 lbs.; NaNO₃, Ca(NO₃)₂ and KNO₃, 250 lbs. per acre every 10 days or 2 weeks during crop. The temps. should be kept from 60°-62° F at night, 65° on cloudy days, and 70°-75° on sunny days. Pruning amounts to the removal of side shoots and occasional broken or yellow leaves. Clover chaff, low grade alfalfa hay, and soy bean straw make satisfactory mulches. The best pollination method is to tap each cluster every day with a light tion method is to tap each cluster every day with a light stick as long as there are any open blossoms.—H. D. Brown.
1246. JONES, HENRY A. Onion breeding. Ann. Rept.

Vegetable Growers Assoc. Amer. 1938: 28-35. 1938.—By selecting, inbreeding, and then massing, it is possible to improve most of the commercial vars. of onions. Nebuka was found highly resistant to thrips, smut, and pinkroot. A mildew resistant var. was developed apparently adapted only to central California conditions. Mildew resistant var. was also highly resistant to purple blotch both in California and Louisiana. Flies were used as pollinators.—H. D. Brown.

1247. KAVALERIDZE, V. Karakteristika pochv opytnoi plantafsii faponskogo tunga Batumskogo Subtropicheskogo Botanicheskogo Sada. (Soils of the experiment plantation of the tung-oil tree, Aleurites cordata, in the Batum Botanical Garden.) [In Russ. with Eng. summ.] Izvestifa Batumskogo Subtropicheskogo Botanicheskogo Sada (Bulletins of Batum Subtropical Botanical Garden) 1: 145-153. 1936(rec'd 10-15-38).—Describes the soils of a small exptl. plantation located on a steep, undulating N. slope in the Batum Bot. Garden. 2 variants of red soil characteristic

of the N. slopes were found-normal and leached. When planting the trees and terracing the slope-surface for making planting-holes, soil changes are encountered. The inner side of the planting-hole adjacent to the slope loses most of its humus, which is removed to the outer side of the hole. The resulting heterogeneity of soil in the feeding area causes an undesirable unequal development of the root system. This may be avoided by deep spading and fertilizing the inner side of the hole with manure, compost, or humus. Under favorable soil conditions, the roots of tung-oil tree can penetrate to considerable depth.—From auth. summ.

1248. MACK, WARRAN B. Pennsylvania studies on the fertilization of truck crops. Ann. Rept. Vegetable Growers Assoc. Amer. 1938: 18-28. 1938.—In long time field exps., larger applications of manure without fertilizer improved total yields of cabbage, potatoes, tomatoes, and sweet corn. Total and early yields of all vegetables were highly correlated. Quality of the 4 vegetables was not greatly affected by fertilizer treatment, though excessive applications of N reduced the quality of tomatoes. Heavy applications of manure raised the level of the soil. (NH₄)₂SO₄ and organic N carriers lowered the pH of the soil despite the

addition of lime.-H. D. Brown.

1249. LIMA, J. F. A Dichogamia nos flores do Abacateiro. [Dichogamy in the flowers of the avocado.] Jor. Agron. 1(1): 1-19. 1938.—In the avocado, stamens and pistils do not mature simultaneously; the sexual organs of the same flower may, therefore, perform differently occasionally. To compare the observations made by authors in the U.S. with conditions in São Paulo, an investigation was carried out during Sept. and Oct., in which many vars. were observed and the flowering habits of native ("commun") trees were studied. Tables show flowering habits of 17 vars., 6-9 years old, in full bearing, all imported from the U.S. A. Of 8 wars. flowering Sept. 23, only Queen behaved normally. Winslowson, Trapp and Fuerte showed flowering characteristics very similar to those reported by Robinson and Savage, the result of a drop in temp. Tables present a comparison of the hours when blossoms are receptive on 2 consecutive days at the Limeira orchard in Brazil in Sept., 1936, as contrasted with the same 8 vars, under Florida conditions. In southern Brazil, except in vars. Queen and Fuerte, the pistil in the 2d period was turgid and of normal color, apparently yet receptive. The following day vars. Gottfried, Taft and Spinks, all grouped under Class A (Robinson's), continued to open. Winslowson, Fuchs and Fuerte, grouped as Class B, presented a complete change in behavior. In the var. Collinson, considered completely sterile of pollen in the U. S., in the orchard at Citra during Sept. not a flower observed showed anthers dehiscing. On Scott 30 between poor and 6 p.m. no open eathers were Sept. 30, between noon and 6 p.m. no open anthers were found. Of 17 vars., the majority had pistils apparently receptive in the early hours of opening in the 2d phase of bloom. From 1 year's work, author concludes that trees imported as well as those same vars, propagated locally, showed flowering habits very similar to those previously reported as to time of normal functioning and its relation to insect activity. Bees and wild insects visited avocado flowers freely. In the wild groves of native trees were found the only examples contradictory to reports from U.S.A.—

H.A. Cardinell.

1250. LOOMIS, N. H., and J. M. LUTZ. The relationship of leaf area and leaf area fruit ratios to composition and flavor of Concord grapes. Proc. Amer. Soc. Hort. Sci. 35: 461-465. 1937(1938).—The influence of rootstock on the quality of Concord grapes was apparently associated with the effect of the rootstock on the vigor of the vine. Uneven ripening and poor color of this var. in the South seem to be due at least in part to lack of vigor and lack of maintenance of a good foliage system. In general 20,000 sq. cm. of leaf surface or more was associated with fruit which was good or very good in color or flavor or both.—N. H:

1251. MAGRUDER, ROY, VICTOR R. BOSWELL, G. W. SCOTT, PAUL WORK, and LESLIE R. HAWTHORN. Descriptions of types of principal American varieties of spinach. U. S. Dept. Agric. Misc. Publ. 316. 1-59. Illus. 1938. A description of the gross morphological characters of the Virginia Savoy, Old Dominion, Dark Green Bloomsdale, Long Standing Bloomsdale, Juliana, King of Denmark, Viroflay, Nobel, Hollandia, and Amsterdam Giant vars., compiled from studies made of the same strains grown at Ithaca, N. Y., Rosslyn Va., Winter Haven, Tex., and Davis, Calif., over a 3-year period. A brief characterization, notes on adaptability and use, a list of synonyms and of similar vars, a brief history for each var, and a discussion similar vars., a brief history for each var., and a discussion of the influence of environment on varietal characteristics are included. The Appendix contains tabular data on the environment and detail measurements of different plant parts at the 4 locations for the 3-year period.—R. Magruder.

1252. MARSHALL, ROY E. Relation of high October temperatures to rate of ripening of apples held in air-cooled storages. Quart. Bull. Michigan Agric. Exp. Sta. 21(2): 108-109. 1938.

1253. MAYURANATHAN, P. V. The original home of the coconut. Jour. Bombay Nat. Hist. Soc. 40(2): 174-182.

1254. MICKLEM, T. Studies on fruit bud formation in deciduous fruit trees in South Africa. I. Growth and fruit bud differentiation in some varieties of deciduous fruits. Iour. Pomol. and Hort. Sci. 16(3): 201-209. 1938.—Studies of fruit bud formation in 3 vars. of Japanese plums, 1 apricot, 2 vars. of peaches, 3 vars. of apples and 6 vars. of pears grown on the Univ. Farm at Stellenbosch indicated that blossom bud formation starts soon after the cessation of terminal growth except on Kieffer pear, in which blossom and formation starts before cessation of terminal growth. Development of buds on shoots of Early Cape apricots pegan 1-3 weeks later than that on spurs and progressed nore slowly. The critical period of blossom bud formation ay between the first of Jan. and middle of Feb. for stone ruits and in Dec. for pome fruits. Diam. increase of 2-yearld wood continued after terminal growth had ceased in some fruits.—E. L. Overholser.

1255. MICKLEM, T. The effect of pruning and shading a fruit bud differentiation and growth in Peregrine peach. our. Pomol. and Hort. Sci. 16(3): 209-216. 4 fig. 1938. ruit buds were collected from trees with fruiting wood roderately thinned out and with fruiting wood headed ack, also from shaded and nonshaded trees. No significant ifference was found in time of fruit bud differentiation om pruning or shading. Shading, however, increased both noot growth of trees and the number of leaf buds deeloped.—E. L. Overholser.

1256. MORRIS, A. A. Some observations on the effect f boron treatment in the control of "hard fruit" in citrus. pur. Pomol. and Hort. Sci. 16(2): 167-184. 1938.—On the lazoe Citrus Estate of S. Africa B from 25 to 1000 g. of per tree, applied to the soil in 1936, benefited growth, af characteristics, and fruiting, and controlled hard uit after one crop was harvested. There was no typical nit after one crop was harvested. There was no typical jury from an oversupply of B. Sugar content was greater fruits from treated than untreated trees, but decreased the amount of B applied was increased. Pectin increased ith the amount of B applied. The intake of elements her than B and possibly N was not affected by B applition. The B content of treated orange trees was roughly oportional to the amount of B applied. Pictures of leaves d fruits of B-deficient trees are given.—E. L. Overholser. d fruits of B-deficient trees are given.—E. L. Overholser. 1257. MOTTS, G. N. Cherry tree mortality in six Michincounties from 1930 to 1938. Quart. Bull. Michigan Michigan Star 21(2): 00.108 1 for 1938 mic. Exp. Sta. 21(2): 99-108. 1 fig. 1938. 1258. OUNSWORTH, L. F. Nutritional studies of celery

relation to certain physiological changes in cold storage. i. Agric. [Ottawa] 19(2): 57-65. 2 pl. 1938.—Quality was idied under the headings of sugar (detd. by osmotic essures), pithiness, breakdown and color changes. Sugar atent was highest on Dec. 10. Pithiness showed up asistently in some fertilizer treatments much more than the others. Pithiness did not increase with ageing of the unt. Lack of P is associated with increased pithiness.
ants from plots receiving little fertilizer or fertilizer deent in 1 or 2 elements were small and maintained their en) color throughout the storage period. Percentage akdown was smallest with treatments receiving heavy plications of N and P. P was the most important elent; K₂O was of no great importance.—L. F. Ounsworth.

1259. PARHAM, B. E. V. Note on a hybrid banana (I. C. 2). Agric. Jour. [Fiji] 9(3): 7. 1938.

1260. PARKER, E. R. Mustards as cover crops; and need of care in purchasing of the seeds. California Citrograph 23(11): 463-464. Illus. 1938.—In recent years certain mustards have frequently been used as winter cover crops in southern California. Occasional crop failures have probably resulted from differences in the var. or strain of seed used. To avoid confusion among seedsmen, the State Department of Agriculture has made adequate descriptions of the wild and cultivated mustards commonly grown here and requires that the proper botanical name be affixed to the labels of packages of seed for sale; growers should use the sabels of packages of seed for sale; growers should use these botanical names when making seed purchases in order to insure securing the proper kind. The 2 spp. commonly grown in southern California are Brassica alba and the "cultivated" form of B. nigra, sometimes improperly called Trieste mustard.—C. S. Pomeroy.

1261. PARSONS, T. H. The cultivation of fruits in Carlon with subtract details. Pomt. Assoc. Carlon Bull.

Ceylon, with cultural details. Dept. Agric. Ceylon Bull.

90. 1-33. 1937.

1262. PHILLIPS, W. R. The application of controlled atmospheres in the storage of fruits. Sci. Agric. [Ottawa] 19(2): 66-68. 1938.—Apple production in Canada is increasing. Ordinary storage practices are such that the demand for apples is being threatened. The obvious results of this state of affairs may be alleviated to a large extent by the use of gas storage. A comprehensive study of the principles involved along with the commercial application of gas storage are being carried out. The results show particular promise in the successful storage of McIntosh apples.-W. R. Phillips.

1263. SCHROEDER, R. A. The importance of root temperatures in growing the fall crop of greenhouse cucumbers. Proc. Amer. Soc. Hort. Sci. 35: 659-660. 1937(1938).—Wilting of cucumber plants was induced by lowering the temp. of the soil from 85° to 60° F. The more favorable conditions were for a high rate of transpiration, the more severe was the wilting. There resulted from this treatment the appearance of the typical leaf and fruit injury which had been causing damage in commercial houses. The exptl. plants were grown at a constant soil temp. by placing the 4-gallon crocks in which the plants were grown in constanttemp. water baths. The plants which were started at a soil temp. of 60° F. made unsatisfactory growth.— $R.\ A.$ Schroeder.

1264. SEATON, H. L. Rhubarb forcing. Ann. Rept. Vegetable Growers Assoc. Amer. 1938: 72-77. 1938.—Two types of rhubarb forcing are used; i.e., petioles grown under full light and those grown in complete darkness. The houses are made mostly of lumber provided with stoves capable of maintaining a temp. of between 50° and 60° F and with adequate ventilation. Rhubarb requires a great deal of fertilization. The winter crop is influenced by the climatic condition under which the plants are grown in the field condition under which the plants are grown in the field. The principal vars. grown are Victoria and Strawberry. The roots are left in the field until they have frozen thoroughly, usually at about 20° F. Roots exposed to 26°-29° F in the field and then treated with ethylene chlorohydrine show an increase of 82% in yield over untreated roots. High humidity should be maintained and adequate roots. The average yield is 2-4 lbs per sq. foot

roots. High humidity should be maintained and adequate soil moisture. The average yield is 2-4 lbs. per sq. foot. Surpluses of rhubarb crop are utilized in making rhubarb juice and by quick freezing.—H. D. Brown.

1265. SEDERHOLM, E. T. The problem of heating a California citrus orchard during a frost night. California Citrograph 23(12): 498, 524-525. Illus. 1938.—The author, an engineer and a successful citrus grower, was one of the few who saved all his fruit during the freeze of Jan. 1937. few who saved all his fruit during the freeze of Jan., 1937. He presents a clear explanation of the principles of frost

protection and the practical means of preventing frost damage in citrus orchards.—C. S. Pomeroy.

1266. SHEPHERD, HARRY W. Woody plants for land-scape use in California. California Agric. Exp. Sta. Ext. Serv. Circ. 109. 1-48. 15 fig. 1938.—Observations in California indicate a wealth of native and exotic woody plants adopted for ornamental purposes. This compilation considers climatic conditions, maintenance, propagation, roadside planting, natural plant associations, grouping plants, nursery stock

selection and lists of trees, shrubs, vines, native and tropical plants available for landscape composition.—H. W. Shepherd.

1267. SMYTHE, ELSIE S. The seasonal cycles of ash, carbohydrate and nitrogenous constituents in the terminal shoots of apple trees and the effects of five vegetatively propagated rootstocks on them. Carbohydrate fractions and lignin. Jour. Pomol. and Hort. Sci. 16(3): 185-200. 1 fig. 1938.—Over a 12-month period bark, wood and leaves of terminal shoots of Lanes Prince Albert apple grafted on 5 vegetatively propagated Malling rootstocks were analyzed for alcohol soluble matter, reducing sugars, sucrose, total sugars, starch (digested by malt diastase), hemicellulose, reserve and total carbohydrates, cellulose and lignin. No significant differences were shown for various stocks except that on one stock, starch and hemicellulose accumulated more rapidly from June onward. Seasonal cycles and ratios of the various fractions were not significantly different for the stocks used. Carbohydrates and lignin have cycles which differ significantly from each other. The proportions of these fractions in bark and wood vary significantly and seasonal cycles in bark are different than those in wood.— E. L. Overholser.

1268. SPINKS, G. T. Pear breeding investigations. Ann. Rept. Agric. and Hort. Res. Sta. Univ. Bristol 1937:

15-30. 1937(1938). 1269. TANAKA, TYÔZABURÔ.

1269. TANAKA, TYÔZABURÔ. Achievements in horticultural research in Japan. *Philippine Agric*. 27(6): 437-444.

1270. TAYLOR, COLIN A. Development of methods for thorough irrigation. California Citrograph 24(2): 52. Illus. 1938.—Extensive tests on over 1000 acres of citrus and walnut orchards have shown the advantages of applying irrigation water in broad, shallow furrows rather than the narrow, deep ones that are in general use. A machine for making these furrows is described.—C. S. Pomeroy.

1271. THORNTON, NORWOOD C. Carbon dioxide storage. XI. The effect of carbon dioxide on the ascorbic acid (vitamin C) content of some fruits and vegetables. Proc. Amer. Soc. Hort. Sci. 35: 200-201. 1937(1938).—Increasing the CO₂ content of the air affected the ascorbic acid content of green bananas temporarily, of asparagus permanently, of newly-dug potatoes but not those dug 150 days, and of garden peas, but did not affect the ascorbic content of ripe bananas, apples, or beans. Removal of bananas from CO₂ to air resulted in a rapid recovery of the ascorbic acid content.—G. M. Darrow.

1272. TOENJES, WALTER. Mahaleb vs. Morello root-stocks for early Richmond cherries. Quart. Bull. Michigan Agric. Exp. Sta. 21(2): 130-131. 2 fig. 1938.—Morello was compared with the standard Mahaleb as a rootstock for the Early Richmond cherry. The trees on the Morello understocks came into bearing earlier and were very productive, but were much dwarfed and assumed a spreading habit of growth much like that of Morello tops.—V. R. Gardner.

1273. TOMMASI, G. La conservazione dei mandarini in frigorifero. Risultati di quattro anni di sperimentazione. [Preservation of mandarins by refrigeration. Results of four years of experimentation.] Ann. Sperim. Agrar. [Rome] 29: 113-128. 1938.—Mandarin oranges were maintained at 4-7° C, 78-83% relative humidity, air circulated. Analyses of acid and sugar content during storage are reported.—F. A. Wolf.

1274. TURNER, D. M. The economic rhubarbs: a historical survey of their cultivation in Britain. *Jour. Roy. Hort. Soc.* 63(8): 355-370. 1938.

1275. VAIDYA, N. G. The seasonal cycles of ash carbohydrate and nitrogenous constituents in terminal shoots of apple trees and the effects of fixed vegetatively propagated rootstocks on them. Jour. Pomol. and Hort. Sci. 16(2): 101-126. 1938.—To see whether marked differences in seasonal cycles could be associated with particular effects attributed to various rootstocks, 5 Malling rootstocks were selected that might be expected to show points of difference. Measurements of Lanes Prince Albert trees planted in 1919 on these rootstocks showed highly significant differences due to the rootstocks. Samples of current season wood, usually leader shoots, were collected on consecutive days between 10:30 and 11:30 a.m. and divided into bark, wood, and

leaves, which were then analyzed for CaO, MgO, K₂O, P₂O₅, Na₂O, Fe₂O₃, Al₂O₃, SiO₂, Mn₃O₄. Water content increased during bud swelling, reached a maximum with the appearance of young shoots, and fell from then to Oct. Percentage of bark was about 75 with young shoots; 45 to 50 in mature shoots. Changes in ash content of wood were lower than those for bark. Individual elements fluctuated somewhat independently of total ash, and fluctuated independently in wood and bark. Definite seasonal cycles were found. Rootstocks influenced tree size, ratios of bark, wood, and leaves in shoots, and the chem. composition of terminal shoots.—E. L. Overholser.

1276. WALKER, H. B. Orchard heater investigations. California Citrograph 24(1): 3, 20-22. Illus. 1938.—No new type of orchard heater is available at a cost comparable to present commercial distilling types, which is materially better than existing types from a smoke output standpoint. The return gas distilling type and the atomizing type show promise of solving the smoke problem but are almost certain to be higher in first cost. Drip heaters which will operate successfully on the poorer grades of fuels have not been developed, although satisfactory heaters of this type are available for using lighter than average oil.—C. S. Pomeroy.

1277. WALLACE, T., and V. G. VAIDYA. A field experiment on the manuring of strawberries. Jour. Pomol. and Hort. Sci. 16(2): 148-166. 1938.—Treatments including 3 dung treatments, complete organic manures containing shoddy and dried blood, respectively, as sources of N, the dried blood organic without K₂O, a complete artificial fertilizer, and no manures were given strawberry plots at the Long Ashton Exp. Station. 5 plantings were made between 1924 and 1937. Growth characters and vigor were affected by the treatments. Dung produced relatively abundant foliage and greatest growth and fruiting. Results from shoddy and complete artificials were similar. Dried blood manure with and without K₂O gave poor vigor. Ripening was not affected. Purpling was the most general symptom of soil deficiency, but marginal leaf scorch was also present where K₂O was not given. Disease and insect damage was not related to manurial treatments.—E. L. Overholser.

1278. WARCOLLIER, G. Considérations générales sur l'état actuel de la pomologie et de la cidrologie en France. Ann. Agron. 8(5): 655-689. 1938.—The decennial mean production in France of apples and pears used to make cider, for the years 1927-1936, was 28,853,476 cwts. Suitable soils on which to grow cider apples, and suitable apple vars, are discussed in a non-specific way. Fertilizer treatments for cider-apple trees are discussed in a general manner. The author writes of a combination of conditions which creates a suitable environment for establishment of a cider industry.—R. R. McKibbin.

1279. WASHBURN, KERMIT V. Asparagus culture. Ann. Rept. Vegetable Growers Assoc. Amer. 1938: 47-53. 1938.

1280. WEBBER, H. J. When did the sweet orange reach Europe? California Citrograph 23(11): 451, 480. Illus. 1938. —While the citron, the sour orange and the lemon are mentioned as introduced into Italy and other Mediterranean countries at much earlier dates, there has been no passage found in history prior to the close of the 15th century that definitely relates to the sweet orange. The Portuguese are known to have brought sweet oranges from China about 1520 and it seems likely they introduced superior strains which later had a profound influence on the industry. A careful study of early exploration accounts leads to the belief that these were not the first sweet oranges known to Europe and that earlier introductions probably came by the Genoese trade route from India in the early part of the 15th century.—C. S. Pomeroy.

1281. WHITE-STEVENS, R. H. Carbohydrate and cellular changes in relation to pithiness of celery in cold storage. Proc. Amer. Soc. Hort. Sci. 35: 649-653. 1937(1938).

—The development of pithiness in the outer petioles of celery in cold storage may be due to loss of respirable carbohydrates due partially to respiration of the tissues involved, mostly to the translocation of carbohydrates in considerable quantity into the crown and from thence to the inner petioles. Data are presented to show the relative

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changes in cellular osmotic pressure of the inner and outer petioles, and periodic chemical analyses of the outer petioles. inner petioles and crowns for hexose, sucrose and polysaccharides. It is tentatively concluded that the carbohydrate translocation occurs in the form of sucrose.-R. H.

FORESTRY

W. N. SPARHAWK, Editor

(See also the section "Economic Entomology—Forest and Shade Trees"; and Entries 105, 106, 110, 125, 127, 133, 161, 1033, 1112, 1330, 1331, 1348, 1395, 1417, 1447, 1504, 1506, 1507, 1508, 1510)

1282. AGUILAR, LUIS. The almaciga resin industry in the Philippines. Philippine Jour. Forest 1(2): 153-169. 5 pl. 1938.—Manila copal or almaciga resin is derived from Agathis alba. Methods of production and marketing are descr.—W. N. Sparhawk.

1283. BADOUX, ERIC. Notes sur la valeur forestière du cyprès de Lawson en Suisse. Jour. Forest. Suisse 89(9/10): 212-218. 1 pl., 2 fig. 1938.—Chamaecyparis lawsoniana was introduced into Europe in 1854. On good sites it has given excellent results, but conclusions as to its value for forestry cannot yet be drawn. Data on its growth in 24-45-yr. old

plantations in Switzerland are presented.—W. N. Sparhawk.
1284. BLANCO, CENOBIO E. Los pinos de Mexico.
[Pines of Mexico.] Bol. Depart. Forest. y Pesca y Caza
3(11): 237-255. 9 pl. 1938.—Descriptions of Pinus teocote,
P. t. v. macrocarpa, P. montezumae, P. leiophylla, P. ayacahuite v. brachyptera, P. lumholtzii, an unidentified 6-needled pine, Pseudotsuga mucronata, and Abies religiosa, with notes on their distrib, and illustrations of young and adult trees, bark, foliage, and cones.—W. N. Sparhawk.

1285. CLINKARD, L. Le pin kauri en Nouvelle-Zélande. Bull. Agric. Congo Belge 29(1): 145-149. 3 fig. 1938.—This tree yields the resinous kauri gum and the wood is used for construction and cabinet purposes. Growth is slow, but natural reproduction in New Zealand justifies renewal of interest in its economic development.—L. Gano.

1286 DETERS, M. E. Frost hardiness of some trees and shrubs for forest planting in southern Michigan. Quart. shrubs for forest planting in southern Michigan. Quart. Bull. Michigan Agric. Exp. Sta. 21(2): 87-90. 1938.—The spring of 1938 was characterized by severe late frosts following an unusually protracted period of warm weather which had caused vegetation to start. Among the spp. most susceptible to late frost injury were: black walnut, English walnut, butternut, red oak, white oak, black locust, honey locust, American chestnut, chinquapin, green ash, white ash, hackberry, Douglas fir, and pecan. Among those most resistant to frost injury because of either late opening most resistant to frost injury, because of either late opening of buds or hardiness of new growth, were: red maple, sugar maple, Russian olive, Siberian pea tree, wild plum, tamarack, northern white cedar, red spruce, red osier dogwood, red northern white cedar, red spruce, red osier dogwood, red pine, jack pine, ponderosa pine, pitch pine, Austrian pine, Scotch pine, and Japanese red pine. Less resistant were: basswood, black cherry, pin cherry, European larch, mountain ash, Chinese elm, Norway spruce, white spruce, Macedonian pine, and Amur River privet.—V. R. Gardner. 1287. DOMES, NORBERT. Die Forstwirtschaft der Ostmark und ihre Beziehungen zur gesamtdeutschen Volkswirtschaft. Forstwiss. Centralbl. 60(15): 465-484; (16): 510-522; (17): 535-544. 2 maps, 2 fig. 1938.

1288. FEKETE, ZOLTAN. A sűrűségi és záródási víszonyszám helyes értelmezése. [The correct interpretation

viszonyszám helyes értelmezése. [The correct interpretation of stock and crown density.] [With Ger., Fr., and Eng. summ.] Erdészeti Lapok 77(10): 841-850. 1938.—Substitution of crown density for stock density when using yield tables may lead to serious errors. Tables show stock density as a function of site class and crown density, for black locust and oak.-W. N. Sparhawk.

1289. FERGUSON, J. H. A. Selectie op stamkwaliteit. [Selection of stem quality.] [With Eng. summ.] *Tectona* 31(9/10): 729-740.4 pl. 1938.—The factors controlling stem form and branching are constant for the individual tree and cannot be influenced by external factors such as site and climate or treatment of the stand. The only way to improve the quality of the stem is by using seed from selected mother trees. The quantity of such seed can be increased by multiplying the mother trees vegetatively, by budding and grafting. This has been done with teak.—W. N. Sparhawk. 1290. FOURMAN, K. L. Untersuchungen über die Bedeut-

ung der Bodenfauna bei der biologischen Umwandlung des Bestandesabfalles forstlicher Standorte. Mitteil. Forstwirtsch. u. Forstwiss. 9(2): 144-169. 1938.—The function of microfauna of the forest soil (protozoa to arthropods) in breaking down forest litter and stumps into humus or other decayed matter is descr., with notes on the numerous spp. participating. Observations were made on 630 stumps of various spp. The breakdown of dry peat through action of microfauna starts and spreads out from stumps, which serve as breeding centers and winter refuges. The fauna increases and decay proceeds more rapidly after the stumps are covered with moss. Development of moss covering can be stimulated by laying partly decomposed litter on top of the stumps.—W. N. Sparhawk.

1291. HASEL, A. A. Sampling error in timber surveys. Jour. Agric. Res. 57(10): 713-736. 5 fig. 1938.—The heterogeneous nature of variation in board foot volume in a 5,760-acre area of pine timber type in NE California was shown by use of Fisher's method of analysis of variance. The analyses were based on a 100% inventory. The effects upon sampling error of size, shape, arrangement of plots, and intensity of sampling were detd, theoretically and checked against actual results from samples taken according to the specifications set up. The smallest size of plot, 2.5 acres, was a more efficient sampling unit than plots of larger size, and long-narrow plots were more efficient than those approaching the square shape. A valid estimate of sampling error was possible only by selecting the sampling units independently and at random. By dividing the area into blocks of uniform size and shape, and selecting equal numbers and at least 2 random sampling units in each, a significant reduction in error variance was obtained as compared to un-restricted random selection. Cruises with plots arranged in a systematic pattern gave somewhat closer estimates of true volume than did corresponding random cruises, but did not contain the information needed for assessing sampling error. A combination of random and systematic

cruising was recommended.—A. A. Hasel.
1292. HAUSRATH, HANS. Zur Femelwaldfrage. Allg. Forst- u. Jagd- Ztg. 114(10): 305-318. 1938.—The advantages

of the selection forest compared with the even-aged high-forest are discussed.—W. N. Sparhawk.

1293. LANTION, DANIEL C. Wild forest seedlings as planting stock. Philippine Jour. Forest. 1(2): 199-210. 1938. —Expts. with 2,000 wild seedlings of Shorea teysmanniana and Dipterocarpus grandiflorus, pulled in the forest, indicate that the use of such stock for forest planting is not profitable. Seedlings under 30 cm. survived better than taller stock.-W. N. Sparhawk.

1294. MANALO, TOMAS J. A commercial volume table for tiaong. Philippine Jour. Forest. 1(2): 171-197. 4 fig. 1938.—A volume table for Shorea teysmanniana, based on an alignment chart, is presented and the method of construction

shown.-W. N. Sparhawk.

1295. MEYEŔ, H. ARTHUR, y CARLOS TREVIÑO SALDAÑA. La aplicacion de los metodos estadisticos a la investigacion forestal. [Application of statistical methods in forest research.] Bol. Depart. Forest. y Caza y Pesca 3(11): 117-175, 4 fig. 1938.

1296. NĚMEC, ANTONÍN, a SERGEJ BORISOV. Chemické vlastnosti polařené lesní půdy v oblasti polesí Oravskeho Komposesorátu v Oravském Podzamku. [Chemical properties of forest soil following alternate cropping, in Slovakia.] [With Ger. and Russ. summ.] Sbor. Ceskoslov. Akad. Zem., 13(3): 435-445. 4 fig. 1938.—Where logging slash was burned and the ashes scattered, the top 30 cm. of soil contained more P₂O₄ and K₂O than that on unburned areas, even after 7 yrs. Cultivation of oats, potatoes, and rye did

not appreciably impoverish the soil. Spruce planted on unburned and uncropped control areas grew slowest; on areas cultivated without addition of ashes the growth was much less than where the ground was burned over prior to cultivation. On the heavy clay soil in question, cultivation of potatoes (but not of oats and rye) had an unfavorable effect on spruce growth.—W. N. Sparhawk.

1297. NEMEC, ANTONIN. Viv jednostranného hnojení

dusíkatými hnojivy na výživu sazenic smrku v lesních školkách. VIII. Vliv hnojení na resorpci žel-za a hliníku. [Influence of unbalanced N fertilizing on the nutrition of spruce in forest nurseries. VIII. Influence on intake of iron and aluminum.] [With Ger. summ.] Sbor. Českoslov. Akad. Zem. 13(3): 445-455. 1938.—Application of nitrates, especially (NH₄):SO₄, on soils containing a fair amount of P₂O₅ resulted in increased Fe₂O₃ content of spruce needles. On soils with less than 100 mg. P₂O₅ per kg., there was little or no increase in Fe₂O₅ with NaNO₅ or Ca(NO₅)₂, but there or no increase in Fe₂U₃ with Na₁Nu₂ or Ua(Nu₃)₂, but there was an increase with (NH₄)₂SO₄. On untreated soil the Fe₂O₃ content of the needles was greater with greater relative solubility of soil nitrates; addition of Na₁NO₃ or Ca(NO₂)₂ resulted in greater Fe₂O₃ content only on soils with low nitrate solubility, but (NH₄)₂SO₄ increased it on all soils. On untreated acid soil the needles contained more Fe₂O₃ than on neutral soils. The Fe₂O₃ content was increased in the needles of the 3 fertilizers on soils with nH greater than by each of the 3 fertilizers on soils with pH greater than 4.0, but was decreased by addition of Ca(NO_s), and (NH₄)₂SO₄ on more acid soils. The Al₂O₅ content of the needles varied directly with that of the soil. Application of (NH₄)₂SO₄ resulted in greater intake of Al₂O₃ on all soils, but with the other 2 nitrates only on soil poor in Al₂O₃. On very acid soils the plants took up more Al₂O₃ than on slightly acid or neutral soils. On the latter soils, application of (NH₄)₂SO₄ resulted in a large increase in Al₂O₃ intake, but the other 2 fertilizers had little effect.—W. N. Sparhawk.

1298. NEUBAUER, WILHELM. Ein neues Verfahren der Bestandesaufnahme. Forstwiss. Centralbl. 60(16): 497-510; (17): 544-555. 1938.—The method consists in calipering the entire stand and computing its vol. from vol. curves or vol. table. This vol. is then corrected on the basis of the ratio of actual measured vol. of the ave. tree to the vol. of the same sized tree as given in the vol. table. The ave. tree of the stand is taken as the tree of median diam. in the stand. A variation of the method is to divide the stand into several portions (e.g., large, medium, and small trees) and select an ave. tree for each portion.—W. N. Sparhawk.

1299. PALLAY, NANDOR. Tajékoztató vizsgálatok a

kanadai- és robusztanyár műszaki tulajdonságairól. [Investigation of the technical properties of Populus canadensis and P. robusta.] [With Ger., Fr., and Eng. summ.] Erdészeti Lapok 77(10): 850-861; (11): 962-974. 1938.— Wood from young trees (up to 11 yrs. old) of the 2 spp. was alike in physical and mechanical properties, and was practically equivalent to wood of Hungarian spruce.—W. N.

Sparhawk.

1300. PEARCE, JOHN. The effect of deer browsing on certain western Adirondack forest types. Roosevelt Wildlife Bull. 7(1): 1-61. Map, 25 fig. 1937.—At present western Adirondack deer usually browse woody growth during the dormant season only. This includes a portion of the fall and spring. Evidence of deer browsing on young trees generally remains for several years. The date such damage occurred usually can be detd. by careful examination of living specimens, often after a lapse of 6 or more years. Deer do not usually browse on the leaders of trees 6 feet or over in height. Deer feed on practically every woody plant except spruce, when in yards of the western Adirondacks. Deer may enable red spruce (*Picea rubra*) to assume dominance by selective browsing on its competitors. This is especially true in drained swamp type where hardwoods, especially red maple (Acer rubrum) and yellow birch (Betula lutea), ordinarily outgrow it. When red spruce is not dominant, as in most spruce flat regeneration, stand composition is nevertheless influenced because of damage to competitors. In old-growth stands the composition of the understory is changed due to browsing of certain species in the undergrowth. This influence is cumulative. Red maple, yellow birch, mountain holly (Nemopanthus mucronata) and witch hobble (Viburnum alnifolium) have special appeal for deer in the western Adirondacks. Red maple, yellow birch, mountain

holly and wild raisin (Viburnum cassinoides) are particularly resistant to repeated browsing. Apparently balsam (Abies balsamea) and mountain ash (Sorbus americana) are not. Witch hobble is the most satisfactory key species or indicator for the general degree of browsing sustained in old growth of western Adirondack forests.-Auth. summ.

1301. PFEFFER, A. Lesní požáry v Československé re-publice v r. 1934. [Forest fires in Czechoslovakia in 1934.] With Ger. and Eng. summ.] Lesnická Práce 17(9): 469-518.

10 fig. 1938

1302. RŮŽIČKA, JAROSLAV. Doklad o škodlivosti nesprávného původu smrkového semene. [The ill effects of wrong seed source with spruce.] [With Ger. summ.] Lesnická Práce 17(10): 533-539. I fig. 1938.—Spruce from seed of alpine origin, planted in so. Bohemia, was stunted and attacked by the fungus Ascochyta piniperda. Spruce from local seed grew well and was not attacked.—W. N. Sourhank Sparhawk.

1303. SCHÖNFELD, R. Untersuchungen über den niederschlessischen Stadtwald. Tharandter Forstl. Jahrb. 89(10): 645-696. 3 fig. 1938.—An account of the history, composition, management, and economic and social values of the city forests in Lower Silesia, Germany.—W. N. Sparhawk.

1304. SCHRADER, ARTUR H. Die Entwicklung der

Forstwirtschaft und der Wälder Lettlands. Zeitschr. Weltforstwirtsch. 5(9): 611-667; (12): 874-918. Map, 5 pl., 15 fig.

1305. SODY, L. Quelques remarques au sujet des matières tannantes au Congo. Agricultura [Louvain] 41 (3): 164-174. 1938.

1306. STEVENS, R. D. Stave volume and defect in oldgrowth white oak. Arkansas Agric. Exp. Sta. Bull. 362, 1-26. 8 fig. 1938.—Measurements of tree boles in old-growth stands indicated that curves based on the smaller DBH classes could not be extended on their trend to include the larger diams, because the smaller groups generally showed too much taper. The taper was rapid in the lower part of the stem, particularly in the larger trees. Individual variations in stem form were large. Old-growth white oak generally was almost cylindrical above the root swell. Girard's tables are the best obtainable for the Ozark region. Cull studies were based on 4,003 trees included in a bourbonstave operation and 1,015 trees in a beer-stave operation. The amount of cull in old-growth white oak in the Ozark region was high. Decay was the largest single contributing cause. Water soak and rot were commonly associated, bearing out the hypothesis that soak is an incipient stage of rot as it progresses down the tree.—J. W. Wellington (courtesy Exp. Sta. Rec.).

1307. TSCHERMAK, L. Baum, Busch und Wald in und um Konstantinopel. Wiener Allg. Forst- u. Jagdztg. 56(39):

223-224, 1938.

1308. TSCHERMAK, LEO. Eukalyptus-Anbau an der Südküste Anatoliens. [With Eng. summ.] Zeitschr. Weltforstwirtsch. 6(1): 3-18. 4 pl. 1938.—Only the coastal districts of Anatolia are suitable for growing eucalypts. Various spp. have been planted as ornamental and shade trees during the last 20-24 yrs., along the south coast, and have grown well. Of the 5 spp. recommended for forest planting (E. globulus, E. rostrata, E. saligna, E. tereticornis, and E. cornula), the 1st 2 are the best. Methods of nursery and planting practice are suggested.—W. N. Sparhawk.

1309. TURNER, L. M. Some profile characteristics of the pine-growing soils of the Coastal-Plain region of Arkansas. Arkansas Agric. Exp. Sta. Bull. 361. 1-52. 8 fig. 1938.—Field observations, physical analyses, and pH determinations of soils on 222 plots in 4 counties showed that the steeper the slope the slower was the height-growth rate. Loblolly pine was usually absent on slopes of more than 7%. Where the slope was less than 1%, growth was slow, owing to poor surface drainage. Shortleaf pine was particularly susceptible to surface drainage. Except on the steeper slopes, deep, loose-structured A and B horizons were conducive to best growth. The best group of soils included no phases that were decidedly lacking in N or P, and the poorest had none that were high in these elements. Soil acidity apparently had little effect on growth rate of the 2 spp. Average pH values of the A and B1 horizons were mostly between 5 and 6. Under the conditions prevailing, direction of slope had

a negligible effect on growth rate. A highly significant correlation was recorded between the rate of height growth of the 2 pines and % of slope, where the % exceeded 3. A definite correlation was observed between rate of growth and depth of the B₁ horizon and also with the clay content of the B₂ horizon. No significant correlation and a slightly significant correlation were noted, respectively, between growth-rate and clay content of the B₁ and the A horizons. The coefficient of correlation with clay content was positive for the A, and negative for the B₁ and B₂ horizons. Apparently, the interaction of several factors was more influential than that of any single factor in determining the rate of height growth of shortleaf and loblolly pines in the area studied.—J. W. Wellington (courtesy Exp. Sta. Rec.).

1310. UGRENOVIĆ, ALEKSANDAR. Die Kenntnis des Holzes und seiner Eigenschaften bei den Römern. Ein Beitrag zur Geschichte der Forstbenutzung. Forstwiss. Centrall.

1310. UGRENOVIĆ, ALEKSANDAR. Die Kenntnis des Holzes und seiner Eigenschaften bei den Römern. Ein Beitrag zur Geschichte der Forstbenutzung. Forstwiss. Centralbl. 60(18): 570-583. 1938.—Citations from numerous Roman writers show that they had considerable understanding of the technical properties of wood. Lacking knowledge of physiology, pathology, and anatomy, they attempted to explain timber properties on the basis of Empedocles' philosophy, i.e., by variations in the combination of the 4 "elements": air, water, fire, earth.—W. N. Sparhawk.

1311. VIADO, JOSE. The cutting test as a practical method of testing viability of seeds. Philippine Jour. Forest.

1311. VIADO, JOSÉ. The cutting test as a practical method of testing viability of seeds. Philippine Jour. Forest. 1(2): 219-225. 1938.—Cutting tests checked fairly well with actual germination of seed of Leucaena glauca, Lagerstroemia speciosa, and Intsia bijuga.—W. N. Sparhawk.

1312. WAGENHOFF, ALBRECHT. Untersuchungen über die Entwicklung des Wurzelsystems der Kiefer auf di-luvialen Sandböden. Zeitschr. Forst- u. Jagdw. 70(9): 449-494. 17 fig. 1938.—The roots of 5 Pinus silvestris trees (46, 80, 152, 165, and 196 yrs. old) from Eberswalde and Finowtal forests, Prussia, were excavated. Development of the root systems was analyzed by counting annual growth rings at various points along the roots. With every tree, horizontal spread of the roots was much wider than that of the crown, at all stages. Max. spread (10-14 m. radius) was reached during the early pole stage, when the roots were 4-5 times as long as the branches. As the older roots died back from the tips their places were taken by substitute roots-rarely by adventitious roots. The assumption that there are only 2 primary xylem strands in horizontal roots is erroneous; there were 3 strands in 47% of the roots investigated and 4 in some. Depth of horizontal roots in the fresh sandy soil under investigation was mostly 0-30 cm., and in no instance more than 50 cm. Tap roots reached 4.5 m. depth in 40 yrs. The tap roots start with 3-4 primary xylem strands, tapering off to 2-3. The extent and form of horizontal root systems throw light on problems of root competition. A tree at some distance may be relieved of competition by cutting a given individual, rather than the tree standing next to the one cut. Correlation of tree rings and weather may be obscured by dying back and recovery of the horizontal feeding roots. The tap root and other deep roots may all die while the crown and stem still appear healthy, providing the horizontal roots remain alive. W. N. Sparhawk.

PHARMACOGNOSY AND PHARMACEUTICAL BOTANY

HEBER W. YOUNGKEN, Editor

(See also in this issue Entries 142, 1177, 1282, 1305, 1525)

1313. ALLPORT, NOEL L., and DAVID FRIEND. An improved method for the determination of total alkaloids in cinchona bark. Quart. Jour. Pharm. and Pharmacol. 11 (3): 450-457. 1938.—The rate of extraction of cinchona alkaloids is greatly augmented by first percolating with alcohol containing alkali, and then continuing with alcohol containing acid, or vice versa. A method of assay, for total alkaloids, based on this principle is described. It is more expeditious than the method of the British Pharmacopoeia, 1932, and yields an alkaloidal residue of equal or greater purity.—H. A. McGuigan.

1314. BERRY, H., and E. M. TEMPLE. The vacuum drying of extracts. Quart. Jour. Pharm. and Pharmacol. 11(3): 364-372. 1938.—Commercial extracts of krameria or cascara can vary considerably in the amt. of matter insoluble in cold water. The cause of this variation is due to variation in the temp. at the time of drying. Control of temp. while drying gives more uniform products and is indicative of

care used in conc. and drying.—H. A. McGuigan.

1315. BRADY, ST. ELMO. Phytochemical study. Seed of the Magnolia grandiflora. Jour. Amer. Pharm. Assoc. 27 (5): 407-417. 1938.—The volatile oil was made up of 2 fractions: (a) light yellow, pleasantly odorous, sp. gr. 0.9474 (25/25°), refractive index 1.4995/25°; (b) dark yellow, pleasantly odorous, sp. gr. 1.519/25°, refractive index 1.519/25°. The fixed oil amounting to 42.5% of the whole seed had the following constants: sp. gr. 0.9652 (25/25°); refractive index, 1.428/25°; iodine number (Hanus), 89.5; saponification value, 182.5. The fixed oil was composed of saturated acids (myristic, palmitic, stearic, arachidic), 20.20%; unsatd. acids (oleic, linoleic), 72.63%; unsaponifiable matter, 2.83%. Also present were: tannin, carotinoid pigments; phytosterol. No alkaloids or glucosides were detected.—G. M. Hocking.

1316. BRIESE, REINHOLD R., and JAMES F. COUCH.

1316. BRIESE, REINHOLD R., and JAMES F. COUCH. Preservation of cyanogenetic plants for chemical analysis. Jour. Agric. Res. 57(2): 81-107. 1938.—Fresh cyanogenetic plants stored at ordinary temps. without preservatives lost 13-83% of their HCN in 1-6 days. At refrigerator temps. for 1-5 days, fresh spur feterita yielded as much HCN as before storage, but \(\frac{1}{2}\to \frac{1}{2}\) less than was obtained by 24-hr. maceration of nonrefrigerated plants. Maceration of refrigerated plants leads to great loss of HCN. Fresh plants stored m air with added CHCl₃, with or without added

alc. KOH or water, lost up to 67% in all but 2 samples. Acid solns, resulted in losses of from 32-96%. Organic bases, such as aniline, P-toluidine and pyridine, were more effective. The losses noted in alkaline solns, appear to be due to destruction of HCN rather than to inhibition of cyanogenesis. Alc. in concs. of 10, 15, 20, 25% was preserved for 3-7 days with losses up to 8%. After a week losses were larger until, after 7-8 wks. 20% of the HCN had been lost. Alc. in concs. of 50 and 95% inhibited cyanogenesis. HgCl₂ in water soln, proved to be an excellent preservative when used in the proportion of 1% of wt. of fresh plant. Specimens so preserved and stored for 6 mos. have shown no loss of HCN. 2% HgCl₂ preserved dried plants reasonably well for 3 mos. With dried sorghums and for longer periods, a higher, undetermined conc. would be required. Plants preserved with HgCl₂ generally yielded more HCN than when not so preserved. In the concs. used HgCl₂ retarded but did not stop enzyme action in cyanogenetic plants. Buffering did not counteract this effect and the addition of CHCl₂ did not accelerate enzymolysis. Addition of enzyme greatly accelerated HCN formation in the presence of HgCl₂. The figure for the HCN content of plant determined after maceration with water or diluted alc. is the resultant of 2 processes—cyanogenesis and destruction of HCN. The value obtained may be considerably below the true figure. Large quantities of HCN are converted into other compounds by heating with very dilute acids. The optimum temp. for storage of samples preserved with HgCl₂ soln. is 25°. An analytical technique for recovering HCN from samples preserved with HgCl₂ was developed. To liberate HCN from Hg(CN)₂, SnCl₂ was found preferable to KI. Hgsl₂ appears to be volatile with steam and deposits in condensers where it reacts with water to form HgI₂ and metallic Hg. The HgI₂ may render distillates turbid and interfere with the end point in titration.—R. R. Briese.

1317. CAIUS. J. F. The medicinal and poisonous spurges of India. Jour. Bombay Nat. Hist. Soc. 40(2): 264-313. 1938. 1318. CARR, C. JELLEFF, and JOHN C. KRANTZ, Jr. Sugar alcohols. XIV. The isolation of polygalitol from Polygala senega and the physicochemical and biological properties of polygalitol. Jour. Amer. Pharm. Assoc. 27(4): 318-322. 1 fig. 1938.—Polygalitol, the 1-5 anhydride of mannitol, was isolated from the fresh leaves and stem (approx. 2%) and from the dried root of P. senega in pure

form. Polygalitol is one of the few anhydrides of the sugar alcohols that possesses a sweet taste; does not potentiate the dissociation of boric acid; is not utilized as a carbohydrate in the animal body (in this respect resembling the other anhydrides of mannitol); and may be attacked by certain bacteria with the production of acid and gas (distinguishing it from other anhydrides of mannitol).—

G. M. Hocking.

1319. CASTIGLIONI, A. Ricerche sulla cellulosa di Solidago serotina Ait. [The cellulose of S. serotina.] Ann. R. Accad. Agric. Torino 80: 51-57. Illus. 1937(1938).

1320. CHOPRA, R. N., R. G. CHATTERJEE, and S. GHOSH. A preliminary note on the chemistry and pharmacology of the leaves of Skimmia laureola, Hook, F. Indian Jour. Med. Res. 26(2): 481-484. 1938.—Skimmianine, originally found in S. japonica, was isolated from S. l. The yield of the pure alkaloid amounts to 1.25 g. per kg. of powdered leaves. It is insoluble in petroleum ether, sparingly soluble in ether and cold absolute alcohol, soluble in hot alcohol and readily so in chloroform. It dissolves in dilute mineral acids only when they are present in excess. The hydrochloride of this alkaloid is readily soluble in water, the resulting pH of the soln. being 1.3 to 1.6. Other salts of the alkaloid were prepd. but they are not soluble except in excess of acid. Its pharmacological action could not be worked out.—R. N. Chopra.

1321. CHOPRA, R. N., S. GHOSH, and A. T. DUTT. Some inorganic preparations of the Indian indigenous medicine. VI. Samudra phena. Indian Jour. Med. Res. 26(2): 485-486. 1938.—"Samudra phena" is the calcareous shell of a mollusk, probably of Sepia officinalis. The result of analysis of a sample is as follows: CaO, 49.725%; SiO₂, 0.580%; Fe₂O₃, 0.324%; Al₂O₃, 0.102%; P₂O₅, 0.048%; CO₂, 38.56%; NaCl, 1.67%; K₂O, trace; MgO, trace; sulphates, trace; water, 3.925%; and organic matter, 5.066%. The N in the organic matter amounted to 0.364% of the total. Of the total Ca, the major portion is present as carbonate and the balance, 0.649% probably as organic Ca. Samudra phena mixed with other ingredients is used in Hindu medicine and is a common household remedy for earache and skin diseases. Whatever action it has is probably due to the large quantities of Ca

action it has is probably due to the large quantities of Ca salts present in it.—R. N. Chopra.

1322. CHRISTENSEN, B. V., and J. A. REESE. A study of the leaves of Ipomoea pes-caprae. Jour. Amer. Pharm. Assoc. 27(3): 195-199. 1938.—Important constituents are: mucilage, volatile oil, a complex resin, fat, a phytosterol, bitter substances, and red pigment. No pharmacol. activity was observable following administration to small dogs of reasonably large doses of petroleum benzin, ether, alcohol, and aqueous extracts of the leaves. Ointments prepared from the leaves and extracts of the leaves have no antiseptic action, as detd. by the agar plate method (U.S.D.A.), using

action, as detd. by the agar plate method (U.S.D.A.), using Staphylococcus aureus.—G. M. Hocking.

1323. CHRISTENSEN, B. V., and ROBERT BLACK-WELL SMITH, Jr. The deterioration of digitalis leaves. Jour. Amer. Pharm. Assoc. 27(10): 841-844. 1938.—Digitalis leaves containing 4.8-11.9% of water deteriorate on standing. The percentage of deterioration which occurs during a storage period of 100 days does not appear to bear any relation to the water content within the above range, or to the temp. of storage between 70° and 100° F. No evidence was obtained that storage in air-tight containers enhances the keeping qualities of the drug during a 100-day storage period.—From guth. concl.

period.—From auth. concl.
1324. DAVID, R. Compléments à l'étude de l'influence des températures élevées sur la vitalité des graines oléagineuses. Bull. Matières Grasses. Inst. Colon. Marseille 22(9): 183-193. Illus. 1938.—Observations on Sinapis alba and Brassica nigra.

1325. FONTANA, C. Ressources pharmacodynamiques de quelques espèces végétales. Ann. Gembloux 44(11): 375-

1326. FOOTE, P. A. A note on the volatile oil of Illicium parviflorum Michx. Jour. Amer. Pharm. Assoc. 27(7): 573-574. 1938.—This oil is 90% safrol. It has the highest safrol content of any volatile oil yet reported.—Auth. summ.

content of any volatile oil yet reported.—Auth. summ.
1327. GIBSON, FREDERICK. Simmondsia californica
Nuttall is dioecious. Contrib. Boyce Thompson Inst. 10(1):
45-46. 1938.—The plants are strictly dioecious. The individual plants grow close together and branches intermix.

giving the appearance of being a single shrub. In planting seedlings for production of jojoba oil only half will be seedbearing.—F. E. Denny.

1328. GILFILLAN, F. A., and CHIEKO OTSUKI. Toxicity

1328. GILFILLAN, F. A., and CHIEKO OTSUKI. Toxicity in the leaves of Rhododendron californicum, Hook. I. Jour. Amer. Pharm. Assoc. 27(5): 396-398. 1938.—The dried leaves were extracted with boiling water, and the extract purified by treating with Pb acetate or with MgO. The extract was toxic, but an isolated crystalline principle (analyzed as $C_{10}H_{24}O_8$) was apparently not. From the mother liquor of the crystals was obtained a resinous substance of high toxicity.—G. M. Hocking.

1329. GOLDBERG, L., R. K. SNYDER, E. H. WIRTH, and E. N. GATHERCOAL. The quantitative determination of volatile oils in vegetable drugs. Jour. Amer. Pharm. Assoc. 27(5): 385-392. 1938.—The comparative efficiency of various methods of determining volatile oil in crude drugs was detd. by using samples of purified, anhydrous sawdust containing known quantities of volatile oil. The U.S.P. XI and several other methods were found to be less accurate than merely to determine total volatile matter by heating at 100° (simple oven method) and then to subtract the moisture detd. by the toluene distillation method.—G. M. Hocking.

1330. GRAHAM, W. E., and A. ROSE. Tannins and non-tannins of the barks of some eastern Canadian conifers, particularly white spruce. Canadian Jour. Res. Sect. B Chem. Sci. 16(10): 369-379. 2 fig. 1938.—The tannin content of the barks of several Eastern Canadian conifers (Thuja occidentalis, Picea rubra, P. mariana, P. canadensis, Abies balsamea, Tsuga canadensis) was detd. by standard methods in an attempt to assess their value as sources of tanning extracts. A more intensive study was made of the extractable materials of white spruce bark. The chem. reactions of the extract from this bark show that the tannins therein are typical examples of the catechol or condensed group. Comparison of the ratio of tannin to non-tannins and the buffer index of this extract with the corresponding values for several commercial extracts indicates that the spruce extract would probably be fairly astringent. The titration curves of various fractions of the extract show some indications of the character of the non-tannin constituents.—Auth. abst.

1331. GROSS, S. T., and G. L. CLARK. A test of the alternate structures proposed for cellulose. Textile Res. 9(1): 7-15. 9 fig. 1938.—Several oriental cellulose materials were investigated to determine whether the unit cell for cellulose proposed by Sauter is more consistent with the x-ray evidence than that originally postulated by Meyer and Mark. A number of patterns have been made of tunicin, bacterial cellulose and valonia ventricosa. All patterns were consistent with the Meyer-Mark unit cell.—Auth. summ.

1332. GUTH, EARL PETER. A phytochemical and pharmacological study of Solanum villosum. Chapter I. Jour. Amer. Pharm. Assoc. 27(3): 217-224. 1938.—Stem, root, leaves, and fruit were studied separately as to ash, extractives with petrol ether, ether, chloroform, and alcohol, and moisture and volatile constituents. The following specific constituents were studied: tannins, fixed oil, carbohydrates (starch, reducing and non-reducing sugars, pentosans), and inorganic salts. The toxic principle is believed due to a sapo-toxin or a compound similar to solanine. The plant is toxic in rather large doses, as death followed a few hours after administration of doses equivalent to 400 g. of fresh material per kg. body weight of rabbit used. Death followed respiratory failure.—G. M. Hocking.

1333. HOCH, J. HAMPTON. Pre-Revolutionary commerce in crude drugs in Carolina. Jour. Amer. Pharm. Assoc. 27 (8): 712-716. 1938.

1334. JARETZKY, R., und H. J. DRIMBORN. Über das Vorkommen von Kieselsäure und Saponin bei den Borraginaceen. (cont.) Deut. Apoth.-Zeit. 53(Beibl., 61): 58-60. 1938.

1335. JONKUS, OLGA, and ROBERT CHARR. Moxa, a strange medical treatment. Amer. Jour. Pharm. 110(9): 406-410. 2 fig. 1938.—An account of "moxi-bustion"—i.e., application of moxa (possibly a prepn. of leaves and stems of Artemisia chinensis and A. vulgaris or A. moxa) as a

counterirritant in Chinese and Korean treatment of tu-

1336. JUDD, DEANE B., and KENNETH L. KELLY. Scientific color naming of drugs. Jour. Amer. Pharm. Assoc. 27(3): 208-211. 4 fig. 1938.—A brief statement of the progress being made in describing accurately all drugs and pharmaceuticals as to color. The system of color names used, as worked out by the Inter-Society Color Council, is explained. $-G.\ M.\ Hocking.$

1337. KAYE, R. C., and A. T. MOORHOUSE. A further investigation of dry extract of stramonium. Quart. Jour. Pharm. and Pharmacol. 11(3): 582-588. 1938.—In the prep. of dry extract of Datura stramonium, 70% alc. is unsuitable; the extract is hygroscopic and becomes sticky when exposed to the atmosphere. Fractionation occurs during evaporation of the percolate and it is difficult to obtain a homogeneous extract. The criticism that the use of 95% alc. yields an objectionably oily extract is not substantiated.—H. A. McGuigan.

1338. PARSONS, T. H. A list of medicinal herbs, indigenous and exotic, that can be cultivated in Ceylon. Dept. Agric. Ceylon Bull. 91. 1-12. 1937(rec'd 3-14-38)

1339. RYDON, H. N. The constitution of caryophyllene. Chem. and Indust. [London] 57(6): 123-125. 1938.—New advances in the elucidation of the structure of caryophyllene are discussed .- B. Tabenkin.

1340. SALGUES, R. Influence de la fumure sur le rendement et la composition de quelques plantes cultivées. Ann. Agron. 8(4): 537-551. 1938.—Studies made on orchard grass proved that N fertilization increased yields, potash the quality. Fenugreek, various medicinals such as meadowsaffron, hemlock and aconite, and plants grown for their essential oils, such as lavender, peppermint, savory and sage, all benefited from fertilization, particularly from the use of N. With soybeans, for bean production neither N synthetics nor farm manure is necessary.—R. R. McKibbin.
1341. STREPKOV, S. M. Über das Verhalten des ätherischen Öls bei Salvia sclarea. Bot. Arch. [Leipzig] 39(2): 166-176. 1938.

1342. STREPKOV, S. M. Dynamik der Bildung des ätherischen Öls in Carum copticum. Bot. Arch. [Leipzig]

39(2): 206-209, 1938 1343. SULIT, MAMERTO D. Some poisonous plants found in the Makiling National Park and its vicinity. Philippine Jour. Forest. 1(2): 211-217. 1938.—Arrow poisons are derived from Antiaris toxicaria, Abrus precatorius, Lophopetalum toxicum, and Strophanthus cumingii, and dog poisons from Rourea erecta, R. volubilis, Jatropha curcas, and Strychnos ignatii.—W. N. Sparhawk. 1344. SUMNER, JAMES B., NILS GRALEN, and INGA-

BRITTA ERIKSSON-OUENSEL. The molecular weights of canavalin, concanavalin A and concanavalin B. Jour. Biol. Chem. 125(1): 45-48. 1938.—Three of the jack bean globulins, canavalin, concanavalin A and concanavalin B, were purified by recrystallization. Through use of the ultracentrifuge and through diffusion measurements their mol. wts. were found to be 113,000, 96,000 and 42,000 respectively. The % of Mn in the hemagglutinin, concanavalin A, had no simple relationship to the mol. wt.—J. B. Sumner.

1345. UHL, A. H. Preparation of resin of Podophyllum.

Jour. Amer. Pharm. Assoc. 27(7): 595-596. 1938.
1346. WAGG, R. E. The Thalleioquin reaction as a qualitative test for cinchona. Quart. Jour. Pharm. and Pharmacol. 11(3): 443-449. 1938.—One of the best tests for quinine is the Thalleioquin test. Quinine in barks containing 0.3 to 0.5% may be detected by this method. 0.1% gives a negative result. A method is given to identify cinchona barks containing 0.5 to 12% quinine.—H. A. McGuigan. 1347. WEBER, U. Radix ginseng, eine Droge mit brun-

sterregenden (östrogenen) Eigenschaften. [Radix ginseng, a drug with estrus-inducing properties.] Süddeut. Apotheker. Zeitung. 78(67/68): 645-648, 657-658. Illus. 1938.

1348. WILLITS, C. O., and C. J. TRESSLER, Jr. Sources of lead in maple syrup and a method for its removal. Food Res. 3(5): 449-452. 1938.—Any Pb that is present in maple syrup has been introduced by contact with the Pbcontaining surfaces of some of the containers during its processing. Until Pb-free equipment is used for processing the syrup, Pb may be removed from the syrup by using milk as the deleading agent. This method is especially applicable to use on the farm. 10% by weight of milk is added to the finished maple syrup and the mixture is then heated until the water content is again reduced to that of maple syrup. The coagulated milk is removed by filtration. This treatment reduces the Pb content of the syrup to less

than ½ of its original content.—C. O. Willits.

1349. YOUNGKEN, HEBER W. Observations on three Louisiana Capsicums. Jour. Amer. Pharm. Assoc. 27(4):
323-331. 7 fig. 1938.—C. annuum var. longum ("Long Cayenne" or "La. Longs"), C. annuum var. conoides (Tabasco Pepper), and (New) Louisiana Sport (a cross between old Sport Capsicum and the Japanese var. of Capsicum known as "Honka") were the plants studied and described. The description is macroscopically of the plant and the fruit, microscopically of the pericarp, seed, and powdered material. Moisture, ether extract, and ash were detd. The pungency assay of the U.S.P. XI is criticized; the author advocates a chemical assay of the capsaicin content or a method of standardizing humans preliminary to using them in the pungency test.—G. M. Hocking.

PLANT PHYSIOLOGY, BIOCHEMISTRY, AND BIOPHYSICS

F. E. DENNY, Editor

(See also in this issue Entries 1, 116, 174, 178, 179, 182, 183, 263, 289, 295, 341, 972, 1060, 1069, 1085, 1165, 1183, 1185, 1188, 1192, 1198, 1203, 1213, 1214, 1225, 1228, 1256, 1258, 1267, 1271, 1273, 1275, 1281, 1297, 1316, 1319, 1324, 1331, 1342, 1446, 1447, 1458, 1472, 1476)

ABSORPTION, NUTRITION

1350. ARRHENIUS, O. Yield and nitrogen uptake of barley in relation to the phosphate and nitrogen content of the nutrition medium. Compt. Rend. Trav. Lab. Carlsberg

[Copenhagen] Sér. Chim. 22: 42-44, 1938.
1351. DASTUR, R. H., and JOHN WINIFRED. The growth of rice seedlings in salt solutions of different H-ion concentrations. Jour. Indian Bot. Soc. 17(4): 255-268. 1938. In all the salt solns, employed, growth was best in the pH range 6.4 to 7. No growth occurred in acid solns. Solns. containing ferric phosphate gave better growth than those without Fe or those containing ferrous sulphate; solns. containing ammonium phosphate and (NH₄)₂SO₄ were superior to those containing KNO₅. In the 2 series of salt solns, combinations which contained ammonium phosphate proved the best. The ordinary culture solns. (Tottingham) were the best of all the solns used.—Authors.
1352. HESTER, J. B. The assimilation of the elements

of nutrition by the tomato plant. Amer. Fertilizer 89(10): 5-7. Illus, 1938.

1353. OLSEN, C. Growth of Deschampsia flexuosa in culture solutions (water culture experiments) and in soils with different pH values. Compt. Rend. Trav. Lab. Carlsberg [Copenhagen] Sér. Chim. 22: 405-411. Illus. 1938.

1354. WILLIS, L. G., and J. R. PILAND. Minor elements and major soil problems. Jour. Amer. Soc. Agron. 30(11): 885-894. 3 fig. 1938.—The introduction of the minor elements into soil fertility problems necessitates a revision of methods of research. Following a discussion of the principles of logic, reference is made to published and unpublished evidence that some of the functions of K can be performed by Cu or Mn. Effects attributed to P may be caused by numerous functions of any of the components of the material supplying the P or to indirect effects of P on the soil including those associated with the oxidation-reduction equilibrium. The functions of various sources of N are discussed with particular reference to oxidation-reduction phenomena. Evidence that lime promotes a condition which increases the need for B and that B may affect the utilization of Mg, Mn and water illustrates the complexity of the lime problem. The fallacies

of current methods of experimentation are discussed in relation to the evidence that many soil variables are not independent as is implied in the law of minimum. According to the principles presented many of the objectives of soil fertility research are irrational and impossible of attainment. _L. G. Willis.

AUXINS, GROWTH HORMONES

1355. COLLA, S. Azione di sostanze sintetiche sulla formazione di radici. [Action of synthetic substances on root formation.] Ann. R. Accad. Agric. Torino 80: 111-118. 3 pl. 1937(1938)

1356. Du BUY, H. G., and R. A. OLSON. Protoplasmic streaming and dynamics of transport through living cells. Biodynamica 36. 1-18. 2 fig. 1938.—The velocity of proto-plasmic streaming was detd. by the displacement of microscopic particles, in cells of Avena coleoptiles through which electric currents were passed. Measurements of growth (every 2 min.) were made on coleoptiles treated in the same way. Direct determinations of auxin transport from apical to basal end of the coleoptiles, by the agar blocks method, were also performed. A comparison of the streaming velocity, the growth rate and of the auxin transported shows that protoplasmic streaming is responsible for changes in the transport of growth regulators. Transport seems to be effected by the stream within the cells and by diffusion through the cell walls. The method used allows a direct observation of protoplasmic changes when a potential is applied, making certain that the current passes within the cells.—B. Luyet

1357. HUBERT, B. The influence of the hydrogen ion concentration of hetero-auxin solutions on root formation. Biol. Jaarb. Natuurw. Genootsch. Dodonaea 5(2): 321-325.

1358. LAIBACH, F. Zur Frage der Inaktivierung des Wuchsstoffes durch Licht. Ber. Deutsch. Bot. Ges. 56(7): 298-306. 1938.—Numerous exps. on auxin-free hypocotyls of *Cucumis* and *Avena* showed a positive geotropism with unilateral illumination when the upper cut surface was treated with paste containing auxin or hetero-auxin. However, there was practically no response when treated with the paste alone. When hypocotyls were first illuminated unilaterally and then treated with the auxin in the dark there was a stronger response than had there been no application of the hormone. Phototropism is not a response to inactivation of the hormone by light but rather to a differential distribution of the hormone in the tissues .-H. C. Beeskow.

1359. LOOFBOUROW, JOHN R., SISTER CECELIA MARIE DWYER, and MARY NORBERT MORGAN. Intercellular wound hormones from ultraviolet injured cells. Stud. Inst. Divi Thomae [Cincinnati] 2(1): 137-153. 1938.—Intercellular wound hormones were produced by irradiating Saccharomyces cerevisiae with full ultraviolet. The materials obtained were assayed for growth stimulating activity on yeast by a quantitative rocker-tube technique. The potency of the intercellular wound hormones was unaltered by drying at 150° F. and autoclaving at 20 pounds for 15 min. The potencies obtained from equal quantities were 16 to 90 times as great in filtrates from irradiated as in those from non-irradiated suspensions. Evidence was obtained that the wound hormones are substances released from the cells into the intercellular fluid as a physiologic response to injury rather than cellular destruction products. The most potent intercellular wound hormone preparations had greater growth stimulating power, both on an equal weight basis and on the basis of yield in growth units per g. of yeast, than country by nearly analysis methor —Authors.

1360 OINONE Attificial parthenogeney by use of

/1360. OINONE, tyni Artificial parthenocarpy by use of auxin. [In Jup. wof lng. summ.] Agric. and Hort. (Nogyo Oyobi Engei) 13/ to 3/2213-2218. Illus. 1938.

1361. SKINN le. In NRY T. Rooting response of azaleas and other ericara.

and other ericacd growthts to auxin treatments. Proc. Amer. Soc. Hort. Scroductior30-838. 1 pl. 1937(1938).—Softwood cuttings of 45th, the dericaceous plants were treated with indolebutyric out the effectic acids at various concs. With a majority less of the treatments with indolebutyric acid resulted in rying stems, centage rooting. Indoleacetic acid was usually found in three. Rhododendrons appeared to

tolerate and give response to high acid concs. (90 mg. per 1.) Treatments reduced the time of rooting by an average of 2 weeks and resulted in the production of larger and better root systems. A sand and peat mixture gave better results in rooting than either sand or peat alone. With 6 vars., propagation by cuttings gave poor or wholly unsuccessful results.—H. T. Skinner.

1362. ZIMMERMAN, P. W., and A. E. HITCHCOCK.

Response of gladiolus corms to growth substances. Contrib. Boyce Thompson Inst. 10(1): 5-14. 1938.—Five varieties gladiolus were treated with naphthaleneacetic acid. indolebutyric acid, and indoleacetic acid, to stimulate root development and induce other responses. The response of corms varied with the concs. and the substances used. Naphthaleneacetic acid had a tendency to induce fleshy roots at the base of the corm resembling contractile roots normally formed at the base of new corms about flowering time. Both indolebutyric acid and naphthaleneacetic acid were effective for inducing contractile roots within a few days after treatment whereas normally contractile roots arise at the base of newly developing corms as flower primordia are forming. The growth substances induced these roots from the upper end of old corms even in the absence of a shoot. The contractile roots induced by naphthaleneacetic acid tended to be fasciated and fleshy, forming a complete ring around the new shoot. The higher concs. of indole-butyric acid induced a few fasciated contractile roots but generally they resembled the normal type. Under certain conditions corms were induced to form roots all over the storage organ though normally they form only around the basal part of the axis. Corms aerated with oxygen with-stood treatment much better than those aerated with CO₂. The latter tended to disintegrate, but if the treatment was stopped in time it was the most effective for inducing adventitious roots throughout the storage tissue. A substance giving the indole test was detected in growing roots and shoots 24 days after indolebutyric acid had been applied to the corms.-From auth. summ.

OSMOSIS, PERMEABILITY

1363. BOGEN, HANS JOACHIM. Untersuchungen zu den "Spezifischen Permeabilitatsreihen" Höflers. II. Urea und Glycerol. Planta 28(4): 535-581. 6 fig. 1938.—The permeability of urea and glycerol was studied and relative permeability expressed as a quotient. Values below 1 were expressed as the negative quotients of glycerol over urea. Urease does not interfere with the permeability of urea. Also salt formation does not enter into the process of urea permeability. The permeability quotient varies with pH, giving a high value around 4.3 with low values around 3 and 7. There is a small secondary rise near 5.8 and the curve rises again steeply from 3.0 to 1.7, there attaining maximum values once more. The curve was first obtained by using various species and various tissues of plants but was found to be valid also for artificially adjusted pH. Urea induces swelling, glycerol contraction. These actions vary in different pH areas. Urea may at certain pH values impede swelling

and thus lower the permeability for glycerol.—B. R. Nebel. 1364. GUILLIERMOND, A., et R. GAUTHERET. Sur la fixation par les cellules végétales vivantes des leucobases de certains colorants vitaux. Compt. Rend. Acad. Sci.

[Paris] 207(8): 417-421. 1938.

1365. HILL, S. E., and W. J. V. OSTERHOUT. Delayed potassium effect in Nitella. Jour. Gen. Physiol. 22(1): 107-113. 6 fig. 1938.—In normal cells of Nitella replacement of NaCl by KCl makes the P.D. much less positive: this is called the K effect. Cells which have lost the K effect usually show little or no change of P.D. when NaCl is replaced by KCl but an occasional cell responds after a delay. It seems possible that the delay may be largely due to the time required for K to combine with an organic substance, thus forming a compound which sensitizes the protoplasmic surface to the action of K.—Auth. summ.

GERMINATION, DORMANCY

1366. GUTHRIE, JOHN D. Inducing "dormancy in potato tubers with potassium naphthaleneacetate and breaking it with ethylene chlorohydrin. Science 88(2273): 86. 1938.—Potato seed pieces treated with ethylene chlorohydrin after treatment with K naphthaleneacetate (inhibitory to bud growth is nondormant tubers) were stimulated to grow much earlier than similar pieces not treated with the ethylene

compound.—F. V. Rand (courtesy Exp. Sta. Rec.). 1367. MICHENER, H. DAVID. The action of ethylene on plant growth. Amer. Jour. Bot. 25(9): 711-720. 1938.-Ethylene gas in low concentrations causes a decrease in longitudinal growth in intact seedlings of Avena sativa and Pisum sativum. It does not influence production or transport of auxin; and it does not affect auxin destruction in the intact Avena seedling (though it may do so in Pisum); but it increases the sensitivity of these plants to auxin. The increase in sensitivity is probably a result of accumulation or activation of some substance other than auxin which is necessary for growth. The method by which ethylene reduces stem elongation in intact plants remains obscure, but it is not attributable to action of ethylene on the auxin in the plant. Auxin in abnormally high cones, and ethylene are alike, however, in their ability to produce abnormal stem enlargements in Avena and Zea mays seedlings; but this reaction requires some substance or reaction which depends on the roots of the plant. As ethylene does not have this effect in the complete absence of auxin, auxin in low concs. is prerequisite to the reaction by which ethylene or auxin causes stem enlargement. Thus there is not a complete similarity between the effect of ethylene and that of auxin on stem enlargements; and there is no resemblance between the effects of the 2 substances on elongation .-H. D. Michener.

1368. OHLSSON, E., und N. THÖRN. Amylasen in ruhenden und keimenden Samen. V. Die Entwicklung der Alpha-Amylase der keimenden Gerste. Compt. Rend. Trav. Lab. Carlsberg [Copenhagen] Sér. Chim. 22: 398-404. Illus. 1938.

1369. THOMPSON, ROSS C. Dormancy in lettuce seed and some factors influencing its germination. U. S. Dept. Agric. Tech. Bull. 655. 1-20. 1938.—Dormancy in lettuce seed can be largely overcome by exposing moist seed to certain controlled conditions of temp. and light. At low temp. light improves germination; above 20° C its influence in stimulating germination decreases rapidly with rise in temp. The post-soaking influence of both light and low temp. in stimulating germination decreases as the time of soaking at temps, above 20° is increased. When treated under favorable conditions of temp, and light the seed can be thoroughly dried and stored for some time and still give a high % of germination.—R. C. Thompson.

GROWTH, DEVELOPMENT

1370. BECK, WILLIAM A., KLAUS SCHOCKEN, and SISTER MARY WINIFRED DONNELLY. Cell enlargement in the hypocotyl of Helianthus annuus. Stud. Inst. Divi Thomas [Cincinnati] 2(1): 107-112. 1938.—The cell enlargement as it normally occurs in the epidermal and cortical sells in the hypocotyl was detd. The data are to be employed n future work. The areas of the cells within 2 regions (0-5 and 45-50 mm. below the plumule) were compared. For the pidermal cells the enlargement was about 1000%, in the ortical cells 600%. The cortical cells were considerably arger than the epidermal cells. The suction tension of the ortical cells was greater than the suction tension of the pidermal cells. The pressure produced by the epidermis educes the suction of the cortical tissues.—Authors.

1371. FUNKE, G. L. Observations on the growth of water lants. II. Biol. Jaarb. Natuurw. Genootsch. Dodonaea 5 2): 382-403. Illus. 1938.

1372. GAUTHERET, R. J. La culture des tissus végétaux. on état actuel, comparaison avec la culture des tissus nimaux. Cytologie et cytophysiologie Végétales. I. Préface e M. A. GUILLIERMOND. Actualités Scientifiques et ndustrielles 554. 1-67. 11 pl., 8 fig. Hermann et Cie: Paris, 937. Pr. 20 fr.—This survey of the results of the culture in itro of plant tissues treats of the conditions of development f these tissues in culture; action of various factors on altures including the external ones of asepsis, light, temp., eration, and consistency and conc. of the medium and the sternal ones of age and degree of differentiation, quantity f the tissue, and the polarity of the piece; the behavior t tissues in culture as to migration, differentiation and edifferentiation; and the correlation of tissue cells. The atture of plant tissues as compared with that of animal

tissues meets with the difficulties of the less permeable cell wall, the lack of an internal medium, the very rapid ageing of the cells and their early differentiation which is incidental to the polarization of meristem tissue. Minute fragments of meristen give at the best only a feeble growth. Cambium has only a slight organization, being practically a homogeneous tissue without any symmetry. Duration of cambium cultures for 8 months has been attained. Prolongation of life of cultures has been attained by addition of growth-exciting substances. Lack of precise knowledge of cell nutrition at present blocks progress. Note is made of the value of tissue culture for study of cytophysiology and of the contrast between the life of calls in wife and in progress. contrast between the life of cells in vitro and in normal associations in the plant. E.g., cambium cells in culture in the light develop no chlorophyll but do so in the plant when

exposed to light.—C. A. Kofoid.

1373. LOOMIS, W. E. The relation of polymerization reactions to meristematic development. Proc. Amer. Soc. Hort. Sci. 35: 860-863. 1937(1938).—Massed meristems in buds and fruits are more effective in utilizing and competing for protoplasm building materials than the diffuse meristems of cambium, pericycle, etc. Diffuse meristems require the action of leaves in light or of auxins to stimulate cell division, This stimulation is accompanied by a significant polymerization of the organic nitrogenous compounds of the tissue. The hypothesis is advanced that massed meristems are able to polymerize digested nitrogenous compounds to proteins, and are stimulated by such compounds, while diffuse, secondary meristems must be supplied with partially condensed substances if they are to function.—
W. E. Loomis.

1374. NOBÉCOURT, P. Sur les proliférations spontanées de fragments de tubercles de Carotte et leur culture sur milieu synthétique. Bull. Soc. Bot. France 85(3/4): 182-188. 1938.—Slices of carrot tubercles, cut up aseptically and placed in a humid atmosphere, proliferate spontaneously and produce new formations which can be cultured on an artificial medium of definite hemical convenience. artificial medium of definite chemical composition. cultures thus obtained can be transplanted in series.—P. D.

Strausbaugh.

1375. PRATT, ROBERTSON. Influence of deuterium oxide on the growth of Chlorella vulgaris. Amer. Jour. Bot. 25(9): 699-701, 2 fig. 1938.—C. v. was cultivated in nutrient solns. prepared with different concs. of D2O. Light of high intensity and a gas mixture that contained 5% CO2 and 95% air were supplied continuously. The amount of growth of the alga decreased as the proportion of D₂O initially present in the solns, increased. Practically no growth occurred in 75% D₂O. The maximum rate of growth was an inverse linear function of the initial fraction of D₂O in the soln.

1376. SCHUYTEN, M. C. De groei der bladeren van Hedera helix. [Growth of leaves of H. helix.] Biol. Jaarb. Natuurw. Genootsch. Dodonaea 5(2): 166-182. 1938.

1377. WILLIAMS, ROGER J. M(annille) Ide, the discoverer of "Bios." Science 88(2290): 475. 1938.—Wildiers, to whom this discovery is attributed because he described it. published it in a thesis. Since he worked under Ide, but Ide's name could not appear on the thesis and since Ide continued to work on bios, Williams assumes that he is the real discoverer.-M. C. Johnstone.

PHOTOPERIODISM

1378. ALLARD, H. A. Complete or partial inhibition of flowering in certain plants when days are too short or too long. Jour. Agric. Res. 57(10): 775-78, 7 fig. 1938.—Plants whose flowering is inhibited when the days are either too short or too long are termed "ind. the ediate" plants, to distinguish them from plants rec: Yubling days or short days, and a large group of plant the fromthy insensitive to length of day known as indetergn. He days, neutral plants. The native eastern wild plantseous Phase out the madens, Phaseolus polysteries and Functions and Functions. The native eastern wild plantseous Plane soil ppear to fall in the intermediate group. I vars: 8tion equigarcane (Saction equiparcane) from and indolerance ied: a flowerthe intermediate group. 'Vars. of discussed G. 292, showed charum spontaneum) from and indolmomena. led: a flowering range lying between higher feases the nets involving steps of 1 hour beginn: less effectie problem. Policiteit bij verschillend gekleurd licht. III. [With Engl. summ.] Biol. Jaarb. Natuurw. Genootsch. Dodonaea 5(2): 404-424. Illus. 1938.

PHOTOSYNTHESIS

1380. SMITH, EMIL L. Limiting factors in photosynthesis: Light and carbon dioxide. Jour. Gen. Physiol. 22(1): 21-35. 6 fig. 1938.—Extensive measurements have been obtained (a) relating photosynthesis and light intensity for a large range of CO₂ concentrations and (b) relating photosynthesis and CO₂ at different light intensities. From these families of curves, the limiting factor relationship can be secured for any value of the photosynthesis rate. In terms of previous work an equation has been derived for describing these relations between the intensity and CO₂ conc. necessary to produce a definite amount of photosynthesis. This equation furnishes an exact description for all the data, except those for low rates of photosynthesis where a slightly different equation is required. The nature of the 2 equations suggests that a simple 1st order reaction determines the velocity of the light process at low photosynthesis rates, but that at high resters mechanism is complicated by another factor.—Auth symme

complicated by another factor.—Auth. summ.

1381. THIMANN, KENNETH V. Absorption of carbon dioxide in photosynthesis. Science 88(2291): 506-507. 1938.—
Absorption of CO₂ in photosynthesis may occur by combination with an aldehyde, or more probably, an organic acid; the light reaction would then be the reduction of the carboxyl group, not of the CO₂ as such.—M. C. Johnstone.

TRANSPIRATION, TRANSLOCATION

1383. LIVINGSTON, BURTON E. Influences that affect transpiration from plant leaves. Sigma Xi Quart. 26(2): 88-101. 4 fig. 1938.—This is a general paper discussing leaf structure and water movement in the leaf, cuticular and stomatal transpiration, fluctuation, variation, and internal and external influences affecting the transpiration rate, stomatal diffusive capacity and its daily fluctuation, diurnal march of the influence of incipient drying of tissues and evaporating surfaces, foliar transpiring power, hygrometric deficit and wind influence, evaporating power of the air, influence of sunshine, and examples of day-night fluctuations in transpiration rate.—F. V. Rand (courtesy Exp. Sta. Rec.).

RADIATION EFFECTS

1384. BITTER, C. RAYMOND. The effect of high frequency irradiation upon Hordeum vulgare. Jour. Colorado-Wyoming Acad. Sci. 2(4): 25. 1938.—Soaked grains irradiated with a current of 60 megacycles per sec. for from 1-15 min., when grown in the greenhouse showed no significant effect from the treatment.—F. Ramaley.

1385. JOHNSON, EDNA L. Growth of wheat plants from

1385. JOHNSON, EDNA L. Growth of wheat plants from irradiated dry and soaked grains. Jour. Colorado-Wyoming Acad. Sci. 2(4): 24. 1938.—Seeds were X-rayed with doses of 1,000-60,000 r. Plants from seeds soaked before irradiation with 5,000 or more r-units died within 3 weeks; the dry groups given 1,000-5,000 r exceeded the controls in tillering, height, and weight. Seedlings from soaked grains surpassed controls only in tillering.—F. Ramaley.

1386. MOSEBACH, GEORG. Über den Einfluss der Lichts

1386. MOSEBACH, GEORG. Über den Einfluss der Lichts auf die Polarisierung der befruchteten Eies von Cystosira barbata Ag. Ber. Deutsch. Bot. Ges. 56(6): 210-225. 1938.— The eggs of Cystosera barbata show a polarized growth in white light of various intensities. A minimum intensity of 1.3 to 2.3 meter candles is required. At these intensities infra-red, red, orange, and yellow are ineffective. The polarizing action begins at 5200 Å and extends into the u.-v. region.—H. C. Beeskow.

1387. SAUROW, E. Versuch der einwirkung von X-strahlen auf Apocynum venetum. Genetica 20: 409-422. 1938.—Radiation of A. venetum with 11 X-ray dosages ranging from 125 to 32,000 r units did not shorten the developmental cycle. In the 1st year's growth, the lighter doses stimulated growth, while heavier doses depressed it, even to the production of mutation-like variants. In the 2d year's growth, the depressing effect of the heavier doses disappeared, but the effect of the milder doses was evident in the bushiness of the plants and in the reduction in percentage of drying stems. The stimulating action of 500 and 2000 r units found in the 1st year could not be detected

in the 2d. Certain doses had a positive action for increasing fiber length, and all doses increased the fineness of the fibers. —E. W. Lindstrom.

RESPIRATION

1388.COOK, ELTON S., CORNELIUS W. KREKE, and LEO G. NUTINI. Fractions from yeast which stimulate the respiration of yeast and animal tissues. Stud. Inst. Divi Thomae [Cincinnati] 2(1): 23-37. 1938.—A simplified Lucas type of fractionation was applied to yeast and the 5 fractions obtained were tested for their ability to stimulate the respiration of yeast, rat liver and rat skin in Warburg manometers. The techniques of assay are described. Fractions were obtained which showed specificity in their stimulation activities. The factors stimulating the respiration of yeast and tissue are apparently distinct. The fractionation process is efficient for the concentration of the yeast factor but not for the tissue factor.—Authors.

1389. MONTFORT, C., und H. FÖCKLER. Licht und Atmung bei Licht- und Dunkelgeweben, grünen und farblosen organen. Planta 28(3): 515-534. 1938.—Exps. were begun in 1936 with marine algae and continued since then with roots and tubers, asparagus plants, seeds and submerged phanerogams. The tissues were fastened in the respiration or assimilation chambers by means of celluloid frames. In case of chlorophyll bearing tissue a single legi or thallus piece was used. Roots, seeds, and fungus bodies are arranged in a plane. Light exposure was obtained from daylight and incandescent lamplight. The O₂ uptake or production was measured by Winkler's method. The thiosulfate values are given with the relative values.—All assimilating tissues show increased respiration when exposed to light and for several hours afterwards. Chlorophyll free tissues respond to white light according to intensity and according to previous history. The strongest response was obtained in the first hour. The sensitive fronds of Trichomanes radicans were completely inactivated for photosynthesis but showed 3 to 4 times the normal (dark) respiration when exposed to strong light. Emerson's interpretation of solarization and sunstroke as due to CO₂ shortage is invalidated. It is believed that light has a general katalytic influence on fermentation in cells.—B. R. Nebel.

1390. WOLF, JOHANNES. Über den Gasstoffwechsel reifender Vogelbeeren. Planta 28(4): 716-720. 4 fig. 1938.—Berries of Sorbus hybrida and S. scandria were examined ripening on the tree at 22° and in storage at 6-8° at 17° and at 32° C respectively. In all temp. ranges the R. Q. rises from below 1 to above 1 and then decreases when measured over the 3 month period of Aug. to Oct. The curves at 32° C are somewhat irregular and fruit stored at this temp. did not develop red color.—B. R. Nebel.

BIOELECTRICAL EFFECTS

1391. COLE, KENNETH S., and HOWARD J. CURTIS. Electric impedance of Nitella during activity. Jour. Gen. Physiol. 22(1): 37-63. 12 fig. 1938.—The changes in the alternating current impedance which occur during activity of cells of Nitella were measured with the current flow normal to the cell axis, at 8 frequencies from 0.05 to 20 kilocycles per sec., and with simultaneous records of the action potential under the impedance electrodes. At each frequency the resting cell was balanced in a Wheatstone bridge with a cathode ray oscillograph, and after electrical stimulation at one end of the cell, the changes in the complex impedance were detd. from the bridge unbalance recorded by motion pictures of the oscillograph figure. An extension of the previous technique of interpretation of the transverse impedance shows that the normal membrane capacity of 0.9 μf. per sq. cm. decreases about 15% without change of phase angle, while the membrane resistance decreases from 10° ohm per sq. cm. to about 500 ohm per sq. cm. during the passage of the excitation wave. This membrane change occurs during the latter part of the rising phase of the action potential, and the membrane electromotive force remains unchanged until nearly the same time. The part of the action potential preceding these membrane changes is probably a passive fall of potential ahead of a partial short circuit. Auth. summ

1392. HILL, S. E., and W. J. V. OSTERHOUT. Nature of the action current in Nitella. IV. Production of quick

action currents by exposure to NaCl. Jour. Gen. Physiol. 22(1): 91-106, 14 fig. 1938.—Treatment of Nitella with NaCl greatly reduces the time required for the action current and produces an action curve with 1 peak instead of the customary 2. The time may be reduced to 0.6 secs. in place of the usual 15-30 secs. This might be expected if the treatment increased the conductivity of the aq. part of the protoplasm. The exps. favor this idea although they do not prove its correctness. This effect is prevented by Ca, possibly, because Ca inhibits penetration of salts. That possibly, because Ca inhibits penetration of salts. That penetration is an important factor is indicated by the fact

penetration is an important factor is indicated by the fact that salts which might be expected to penetrate rapidly have the most effect. Thus NaSCN is more effective than NaCl but NaSC₄ has little or no effect. The action of NH₄Cl and LiCl is similar to that of NaCl.—Auth. summ. 1393. OSTERHOUT, W. J. V., and S. E. HILL. Pacemakers in Nitella. II. Arrhythmia and Block. Jour. Gen. Physiol. 22(1): 115-130. 15 fig. 1938.—Many forms of irregular rhythm and of partial block occurring in the vertebrate heart can be duplicated in Nitella. In order to observe these phenomena the cells of Nitella are kept for 6 wks. or more in a nutrient soln. They are then exposed for 3 hrs. or less to 0.01 M NaCl, NaSCN, or guanidine chloride, which or less to 0.01 M NaCl, NaSCN, or guandine chloride, which reduce the time required for the action current to about 1 second (the normal time is 15 to 30 sec.). A pacemaker is established at one end of the cell by placing it in contact with 0.01 M KCl. This produces action currents at the rate of about 1 per sec. Apparently some parts of the cell are unable to follow this rapid pace and hence fall into irregular rhythms (arrhythmia) and fail to register all the impulses (partial block).—Auth. summ.

METABOLISM, GENERAL

1394. RUHLAND, W., und K. RAMSHORN. Aërobe Gärung in aktiven pflanzlichen Meristemen. Planta 28(3): 471-514. 2 fig. 1938.—The RQ of young growing tissues may be above 2 fig. 1938.—The RQ of young growing tissues may be above 1. This is due to aerobic fermentation. Ethyl alcohol and acetic acid and an alcohol dehydrase are present, and probably an alchydrase. The fementation is limited to meristems. The O₂ consumption of dividing tissues is less than that of elongating or mature tissues. Meristems not severed from the plant may show fermentation without respiration. Under exptl, conditions the RQ falls quickly due to shortege of supply, while the O₂ consumption remains due to shortage of supply, while the O2 consumption remains constant. Aerobic fermentation occurs during multiplication of yeasts and fungi not accompanied by elongation.—B. R. Nebel.

CARBOHYDRATE METABOLISM

1395. WOLF, JOHANNES. Beobachtungen über Veränderungen des Gehaltes an organischen Säuren im Blutungssaft von Birke (Betula alba) und Ahorn (Acer pseudoplatanus.)

Planta 28(4): 721-724. 1 fig. 1938.—The pH values ranged
from 5.1 to 5.4 in the birch and from 5.8 to 6.35 in the
maple. The N side of the tree has more acids than the S. Most of the acid is malic acid, a lesser amount citric acid. Both acids—and total acids—decreased sharply at first and remained fairly constant during the latter period. The observations were made during the time between April 2 and Apr. 11.—B. R. Nebel.

NITROGEN METABOLISM

1396. CULTRERA, R. Contributo alla conoscenza del metabolismo azotato delle piante. V. Influenza delle varie radiazioni luminose sulla elaborazione delle sostanze azotate. The N metabolism of plants. V. Influence of various qualities of light on the elaboration of nitrogenous material.]

Atti Soc. Nat. e Mat. Modena 68: 53-59. 1937.

1397. NIELSEN, NIELS, und VAGN HARTELIUS. Un-

tersuchungen über die Stickstoffassimilation der Hefe. VIII. Untersuchungen über die Stickstoffabgabe der Hefe während Untersuchungen über die Stickstoffabgabe der Hefe während des Wachstums. Compt. Rend. Trav. Lab. Carlsberg, Sér. Physiol. 22(2): 23-47. 1 fig. 1937.—Yeast was grown on 10% glucose with salts and a little wort, glycine being the sole source of N. The use of large bottles enabled the surface-volume ratio to be kept nearly constant in spite of continued sampling. For periods up to 45 days no NH_s was excreted. This supports previous findings that yeast does not excrete NH_s, but organic N. Hence when (NH_s)-SO_s was the sole source of N, the difference between total N and NH_s-N

in the medium gives the N excreted. This increases steadily with time. When the (NH4) SO4 was plentiful (over 100 mg%), so that NH₃ remained after the glucose was conmg%), so that NHs remained after the glucose was consumed, 5-6% of the dry weight of the yeast was N. Such N-rich yeast excretes about \$\frac{1}{2}\$ of its N during the growing period, very little after growth ceases, and a further amount after autolysis begins. When (NHs) \$\frac{1}{2}\$Os was low, so that the NHs was consumed before the sugar, only 2\$\frac{1}{2}\$-3% of the dry weight of the yeast was N, and only 10% of the N was excreted during the growing period. The total N excretion of the N-rich yeast was 16-70% of its N content that of the of the N-rich yeast was 16-70% of its N content, that of the N-poor yeast only about 10%, during the whole exptl. period of 45 days. The N excretion during autolysis was in either case less than that during the growing period .- K. V. Thimann.

VITAMINS

1398. BONNER, JAMES, and JAMES ERICKSON. The Phycomyces assay for thiamin (vitamin B1): the method and its chemical specificity. Amer. Jour. Bot. 25(9): 685-692. 1938.—P. blakesleeanus requires an external supply of vitamin B₁ for growth to occur in synthetic medium. The vitamin may be replaced by a mixture of the 2 constituent portions of the vitamin molecule, i.e., an appropriate pyrimidine and an appropriate thiazole. In order that a thiazole be active as a growth factor for *Phycomyces* (in the presence of excess of the appropriate pyrimidine) it is essential that (1) there be present a N atom which may form a quaternary salt with the vitamin pyrimidine, and (2) that there be present an OH group or a group readily metabolizable to such. If this OH group is removed to a position in the thiazole nucleus other than that which it occupies in the vitamin thiazole, the activity of the thiazole as a Phycomyces growth factor is diminished or abolished. 2 thiazoles having each one more C atom than the vitamin thiazole possess small, real activities. A pyrimidine to have activity as the pyrimidine component of a mixture for supporting the growth of *Phycomyces* must possess (1) a reactive group such as CH₂Br or CH₂NH₂, capable of combining as a quaternary salt with the thiazole, and (2) an amino group in the position. Vitamin analogs consisting of vitamin pyrimidine combined with analogs of the vitamin thiazole possess the same activity upon the growth of Phycomyces as a mixture of the pyrimidine and the same thiazole. In vivo synthesis to the vitamin analog, if it occurs, does not limit the

activity of the thiazole analogs.—J. Bonner.

1399. WOLF, JOHANNES. Über Schwankungen des Gehaltes an Ascorbinsäure in abgeschnittenen Blättern von Bryophyllum calycinum bei verschiedenen Temperaturen. Planta 28(4): 725-729. 3 fig. 1938.—Ascorbic acid was detd. after Tillmanns, Harris, Shinohara and by iodine titration. At 20° C it decreases rapidly. At 37° and at 7° C, the amount remains constant if the leaves are kept in the dark. The changes cannot be immediately related to the peculiar balance of the KH composition (acid formation) in crassulaceous leaves.—B. R. Nebel.

HARDINESS, LOW TEMPERATURE RELATIONS

1400. GOETZ, A., and S. SCOTT GOETZ. Death by devitrification in yeast cells. *Biodynamica* 43. 1-8. 2 fig. 1938.— Films of yeast cultures supported on a metal loop were vitrified in isopentane at -160° and exposed thereafter for 30 min. to recrystallization temps, extending from -150° to -5° . The death ratio was then detd, by the methylene blue test. The death curve shows that the number of killed cells increases gradually from the recrystallization temperature of -140° to that of -5°. This curve follows the exponential relation predicted by the thermodynamic interpretation of recrystallization.—B. Luyet.

1401. LUYET, B. J., and H. M. CONDON. Temperature relationships and ice-water proportions during death by

relationships and ice-water proportions during death by freezing in plant tissues. Biodynamica 37. 1-8. 2 fig. 1938.— Hollow, thin walled cylinders of potato tubers, fitted about the bulb of a thermometer, were frozen slowly and their freezing curves established. After various freezing times the number of living cells, i.e., of cells capable of plasmolysis and of vital staining, was counted and the amount of ice present calculated from the curves. A piece of potato weighing 2½ g. could then, without being damaged, be exposed for at least 12 min. to freezing temps. above —0.5°, and have about 35% of its water congealed. The cells died when 40% to 70% of the water congealed, between -0.5° and 3.5° , and from the 15th to the 25th min. of exposures. After all the cells were dead, ice continued to form in the tissue.—B. Luyet.

1402. LUYET, B. J., and P. M. GEHENIO. The survival of moss vitrified in liquid air and its relation to water content. Biodynamica 42. 1-7. 1 fig. 1938.—Moss plants having acquired definite water contents by exposure to atmospheres of given vapor pressures were vitrified in liquid air and warmed either slowly in the air or rapidly by immersion in water at +20°C. The vitality of the cells of the leaves was then tested by plasmolysis. Plants which contained more than 65% water had their cells alive when they were warmed up rapidly and dead when they were warmed up slowly. Plants containing less than 30% water had their cells alive no matter what was the warming procedure followed. Plants containing from 65% to 30% water had their cells alive when they were warmed up rapidly, and they had a number of living cells gradually increasing for decreasing water contents, when they were warmed up slowly. These results confirm the theory that vitrification in liquid air is not lethal and that, when death occurs, it results from the formation of ice during devitrification, that is, during the too slow warming through the zone of dangerous devitrification temps. in the neighborhood of —15°C.—B. Luyet.

PIGMENTS

1403. BECK, WILLIAM A., and SISTER M. PETRONELLA SCHROEDER. The relation of pigment production to the size of seeds. Stud. Inst. Divi Thomae [Cincinnati] 2(1): 101-105. 1938.—The amount of pigment developed in seedlings grown from large, medium-sized, and small seeds was studied to determine if possible a relationship between the mass of sunflower seeds and the quantity of pigment developed in the cotyledons. The age, sprouting conditions, exposure period, temp., and relative humidity for the 3 groups of seeds were the same. Under these conditions the amount of pigments (chlorophyll, xanthophyll, and carotene) was roughly proportional to the mass of the seeds.—Authors.

1404. LAWRENCE, WILLIAM JOHN COOPER, JAMES ROBERT PRICE, Mrs. GERTRUDE MAUD ROBINSON, and ROBERT ROBINSON. A survey of anthocyanins. V. Biochem. Jour. 32(10): 1661-1667. 1938.—Employing methods previously described (Robinson, G. M., and Robinson, R., Biochem. J., 1931, 25, 1687; 1932, 26, 1647; 1933, 27, 206; 1934, 28, 1712), additional flower petals and permanently pigmented leaves were examined, to determine the nature of the anthocyanin present. In addition, the autumnal coloring of over 200 spp. and vars. was studied. Cyanidin derivatives predominate to a much larger extent in autumnal coloration than in normal flowers and blossoms.—R. Robinson.

TROPISM, MOVEMENTS

1405. HUBERT, B. A simple apparatus for automatic cinematographic registration of plant movements. *Biol. Jaarb. Natuurw. Genootsch. Dodonaea* 5(2): 330-334. Illus. 1938.

1406. STOPPEL, R. Die Schlafbewegungen etiolierter Blätter von Phaseolus multiflorus sind tageszeitlich von der Wirkung eines unbekannten Faktors abhängig. Ber. Deutsch. Bot. Ges. 56(5): 177-190. 1938.—The causes of the diurnal movements of leaves of P. multiflorus in continuous darkness are considered. The cause of the rhythmic movements is undetermined. Brünning's work, indicating that the movements are due to some intrinsic characteristic of the plant, is criticized.—H. C. Beeskow.

TOXICITY

1407. BRENCHLEY, WINIFRED E. Comparative effects of cobalt, nickel and copper on plant growth. Ann. Appl. Biol. 25(4): 671-694. 3 pl. 1938.—An account is given of present knowledge of the distribution and the physiol. importance of Ni and Co, in relation to plants and animals. Exps. on barley and broad beans were carried out in water cultures with the sulphates and chlorides of Co, Ni and Cu. In every case a range of low concs. did little or no damage, but toxic action occurred abruptly above a conc. which

varied with the species and with the compound. With barley, Cu was the most poisonous element in either compound, but the differences were not striking; low cones. of the sulphate were innocuous, but parallel low strengths of the chloride caused a slight, significant depression in growth. With broad beans Co was much more poisonous than either Ni or Cu, particularly with the sulphate. No slight depression with low cones. of the chloride was noticeable with this species. Cu, in poisonous strengths, caused shortening and "bunching" of barley roots; Ni and Co permitted the growth of long, slender roots. The individuality of plant response to poison was frequently shown by the great variation in growth in the borderline cones. just below those which caused marked depression of growth.—W. E. Brenchley.

1408. HUBERT, B. Copper tolerance of Penicillium waksmani Zaleski. Biol. Jaarb. Natuurw. Genootsch. Dodonaea 5(2): 326-329. 1938.

1409. HURD-KARRER, ANNIE M. Relation of sulphate to selenium absorption by plants. Amer. Jour. Bot. 25(9): 666-675. 2 fig. 1938.—Plant analyses have shown that absorption of the Se of Na selenate varies directly with the amount available to the plant and inversely with the conc. of sulphate, within limits. With a Se/S ratio of 1:4 in the nutrient soln. wheat plants were similarly chlorotic and all contained about 1300 p.p.m. Se although the absolute amounts of Se available ranged from 4 to 24 p.p.m. Se absorption was reduced by excess sulphate, sometimes to but 1/10 that in corresponding low-sulphate cultures, but it was never entirely prevented. The effect was more pronounced with young plants than with old ones. The amount of Se that wheat plants can contain without visible injury depends on their S content. When this was high, 700 p.p.m. of Se in the tissues produced no visible effect; when it was low the plants were chlorotic with about \$\frac{1}{2}\$ this amount. The antagonism is discussed in relation to the idea that Se can be combined in the place of S in syntheses of organic compounds.—A. M. Hurd-Karrer.

1410. WIELER, A. Über die Einwirkung von Blei- und Zinkverbindungen auf Wachstum und Entwicklung von Kulturpflanzen. Mitteil. Forstwirtsch. u. Forstwiss. 9(2): 175-191. 1938.—In acid moor soil, addition of Pb minerals did not hinder growth of spruce and pine seedlings, and in some instances favored growth of pine. Oak and beech seedlings were injured by lead. In slightly acid heath soil growth of spruce was hindered by white lead and metallic Pb, and all Pb compounds were harmful when the soil was made alkaline by liming. The growth of certain plants in alkaline soil was retarded by some compounds and not by others, while other plants reacted differently in the same soil. Root growth of spruce and pine was stimulated by addition of 0.16-0.26% Pb. Addition of 1-2% Pb reduced growth of spruce roots, but did not affect pine. Zn retarded growth of crop plants when more than 0.16-0.19% was present in garden soil with alkaline reaction, or more than 0.4-0.16% in acid soil. The harmful effect can be partly offset by addition of lime.—W. N. Sparhawk.

POLARITY, GRADIENTS

1411. ZIMMERMAN, P. W., and A. E. HITCHCOCK. Modified storage organs in Helianthus tuberosus. Contrib. Boyce Thompson Inst. 10(1): 1-3. 1 fig. 1938.—Plants were grown from stem cuttings with all basal buds removed. When these were planted they could not give rise to rhizomes. Under normal conditions tubers are formed in the autumn on rhizomes which arise from underground buds. In the absence of rhizomes the basal part of the stem became fleshy and served as a storage organ. The regulating force which caused rhizomes to form tubers under normal conditions became active at the base of the stem when no rhizomes were present.—P. W. Zimmerman.

APPARATUS, METHODS

1412. BOLIN, D. W., and A. M. KHALAPUR. A precise method for the determination of carotene in forage. *Indust.* and Engineer. Chem. (Anal. ed.) 10(8): 417-418. 1938.

1413. STREPKOV, S. M. Einfluss der Desalbuminierung und Entfärbung der pflanzlichen Extrakte bei Mikro-

bestimmung der Zucker. Bot. Arch. [Leipzig] 39(2): 210-218.

1414. YNALVEZ, LAURO A. A modified fumeless nitrogen digestion apparatus. Philippine Agric. 27(6): 510-511. I fig. 1938.

MISCELLANEOUS

1415. FUNKE, G. L., F. de COEYER, A. de DECKER, and J. MATON. The influence of the emanation of apples

on several life phenomena of plants. Biol. Jaarb. Natuurw. Genootsch. Dodonaca 5(2): 335-381. Illus. 1938.

1416. POBEGUIN, THÉRÈSE. Sur la succession des cristallisations dans le mucilage de la tige de Tradescantia zebrina. Note préliminaire. Bull. Soc. Bot. France 85(3/4): 204-206. 1 fig. 1938.—When fresh twigs are cut quadratic crystals form in the mucilage flowing from the tissues .-P. D. Strausbaugh.

PHYTOPATHOLOGY

FREEMAN WEISS, Editor

(See also in this issue Entries 35, 49, 65, 66, 987, 1033, 1187, 1192, 1198, 1205, 1206, 1232, 1237, 1256, 1257, 1263, 1277, 1302, 1354, 1407, 1489, 1603)

DISEASES CAUSED BY FUNGI

1417. BIRCH, T. T. C. A synopsis of forest fungi of significance in New Zealand. New Zealand State Forest Serv. Bull. 9. 1-17. 1938. Reprinted from New Zealand Jour.

Forestry 4(2): 1937.

1418. BUDDIN, WALTER. Root rot, shoot rot and shanking of tulips caused by Phytophthora cryptogea Pethybr. & Laff. and P. erythroseptica Pethybr. Ann. Appl. Biol. 25(4): 705-729. 2 pl. 1938.—Isolations from tulip plants on commercial nurseries and comparisons with plants on commercial nurseries and comparisons with authentic cultures both in vitro and in large scale soil contamination exps. showed that both spp. of *Phytophthora* can cause a serious disease of forced tulips that is widely distributed in Great Britain. A similar disease was produced in outdoor plantings by contaminating the soil. Infection takes place through the roots, commencing soon after planting, and, according to the virulence of the strain or shoot being produced, a shanked flower, or a marketable flower in spite of some root infection. Commercial bulbs have not been found to carry the disease, and the spread in the exptl. greenhouse from an inoculated bulb is slow. Partial sterilization of contaminated soil by steam, or formaldehyde, combined with hygiene is effective, but Cheshunt Compound is unsatisfactory. P. c. var. richardiae and P. parastica appear to be of little consequence in tulip forcing.-W. Buddin.

1419. GARRETT, S. D. Soil conditions and the take-all disease of wheat. III. Decomposition of the resting mycelium of Ophiobolus graminis in infected wheat stubble buried in the soil. Ann. Appl. Biol. 25(4): 742-766. 1 pl. 1938.—The decline in viability of the resting mycelium of O. graminis in artificially infected wheat straw was followed in differently treated soils by means of a glass tumbler technique. Viability of the fungus was detd. at intervals by a wheat seedling test. The disappearance of *Ophiobolus* from the straws is attributed to decomposition of its mycelium by the other soil microorganisms, since in its resting phase the fungus tolerated adverse physical conditions of the soil better than those optimum for microbiological activity. Decline of the fungus was indefinitely postponed in air-dry soil and in soil at 2-3° C; it was slower in a saturated soil than in one at medium moisture content. Loss of viability was hastened by addition of organic matter of low N content, e.g., glucose, starch and rye-grass meal, to the soil; it was more rapid in rich and heavy soils than in poor, light soils, and was accelerated by partial sterilization and reinoculation of the soil. These effects, together with that resulting from improvement of soil aeration, were attributed to rise in numbers and activity of the general soil microflora. Addition to the soil of organic materials rich in N, such as dried blood, or of (NH₄)₂CO₅, prolonged the life of Ophiobolus in the straws, leading to the hypothesis that the fungus mycelium serves as a source of N for the decomposition of the straw, except in the presence of a more readily available N source.—S. D. Garrett.

1420. HIRAI, TOKUZO. Diseases of the banana in transport from Formosa. [In Jap. with Eng. résumé.] Ann. Phytopath. Soc. Japan 8(2): 145-166. 11 fig. 1938.— The wastage of bananas produced in Formosa in transport is estimated to be about 2% of the total shipment, i.e., about 300,000 Yen per yr. 59% of the wastage is due to non-infectious diseases, 28% to fungus diseases. The principal

causes of the physiogenic diseases are extremes of temperature. Thielaviopsis paradoxa, Botryodiplodia theobromae, Corticium centrifugum, Gloeosporium musarum, Rhizopus Corticium centrifugum, Gloeosporium musarum, Khizopus nigricans, Macrophoma musae, and Fusarium spp. are the fungi concerned. For B. theobromae, G. musarum and T. paradoxa, mycelial growth is best at 28°C and is retarded at 11°C. He recommends transport at 11°C for best keeping quality.—Y. Tochinai.

1421. IWADARE, S. On a new anthracnose of cotton occurring in Manchukuo. [In Jap.] Jour. Sapporo Soc. Agric. and Forest (Sapporo Norin Gakkwaiho) 29(143): 27-45. 2 pl. 1938.—Colletorichum an similar to C indirum.

1933.—Colletotrichum sp., similar to C. indicum.
1422. JONES, FRED REUEL. A seed-borne disease of sweet clover. Phytopath. 28(9): 661-662. 1938.—Ascochyta caulicola is a seed borne fungus of limited distr. in the U.S. (Montana, Ohio, Illinois, Nebraska, Wisconsin, Iowa, Penna.).—F. R. Jones.

1423. OSTERWALDER, A. Von seltenen Ueberwinterungsorganen des echten Rebenmeltaupilzes (Oidium). [Rare overwintering organs of grape mildew.] Schweiz. Zeitschr. Obst- u. Weinbau 47(22): 440-444. Illus. 1938.

1424. POMERLEAU, RENÉ. Recherches sur le Gnomonia ulmea (Schw.) Thum. Nat. Canadien. 64(11): 261-289; (12): 297-318. 1937; 65(1): 23-41; (2): 57-70; (3): 89-97; (4): 125-137; (5): 157-188; (8/9): 221-237; (10): 253-279. 30 pl., 3 fig. 1938.—This pest attacks various elms, its spring ascospore expulsion being synchronized with leafing; it is a strictly obligate parasite. The life cycle is completed after the fall of the leaves with the formation of ascospores, about the beginning of Dec., or earlier, and these hibernate in dead leaves under the snow. In spring at about 45°F discharge occurs with alternate dry and moist conditions, the spores being expelled with projectile-like force. Ascospores were discharged from April 2 to June 19. Even at a favorable temp., low rainfall results in less dissemination and infection. After expulsion from the perithecia, the ascospores germinate promptly in the presence of a thin film of water, but their period of viability is brief. After 12 hrs. the spores show long germ. tubes, a secretion from which aids their attachment to the host and in penetrating the cuticle. The mycelium grows between the cuticle and epidermal cells, and between the palisade cells to the inner lacunae, and even to the lower side. Conidia then develop and may give rise to several secondary generations. Penetration occurs in the same manner as that descr.; the period of incubation, as in primary infection, is 10-20 days. Sexual forms issue from the asexual, but do not begin before late June. Such spores, toward the end of Nov., are formed and matured by a series of transformations of the fruiting organs. The sexual mechanism fits well into the general plan found among higher Ascomycetes. Elm leaves at a height are less susceptible; those attacked are inclined to fall earlier. disease is relatively common but not economically serious. Burning fallen leaves, and spraying where practicable, are recommended for control.—A. L. Pickens.

1425. STRAIB, W. Ergebnisse und Probleme der Getreiderostforschung. Angewandte Bot. 20(5): 349-365. 1938.—A general discussion of the problems and results of investigations on cereal rusts with special reference to German conditions. Consideration is given to such questions as the specialization of the rusts, varietal resistance, the influence of environmental factors on resistance, and the

inheritance of resistance.—T. Johnson.

1426. STRONG, FORREST C. Prevalence of wilt diseases in maple and elm. Quart. Bull. Michigan Agric. Exp. Sta. 21(2): 96-99. 1938.—Of the samples of wilted maple and American elm examined in 1938, wilt-producing fungi were absent in 40%; wilting in these is attributed to non-parasitic factors. In the other samples, Verticillium, Dothiorella and Coniothyrium appeared, in order named. V. R. Gardner.

1427. SUBRAMANIAM, L. S., and B. L. CHONA. Note on Cephalosporium sacchari Butl. (Causal organism of sugarcane wilt.) Indian Jour. Agric. Sci. 8(2): 189-190. 1938.—Characters of spores produced in culture are given; the fungus is not a typical Cephalosporium. Some of the observations would indicate that it is really Fusarium monili-

1428. WRIGHT, ERNEST. Further investigations of brown-staining fungi associated with engraver beetles (Scolytus) in white fir. Jour. Agric. Res. 57(10): 759-773. 4 fig. 1938.—Two brown-staining fungi were found associated with specific Scolytus beetles infesting separate parts of white fir trees in California. Trichosporium symbioticum was previously reported constantly associated with Scolytus ventralis beetles. The 2d fungus, Spicaria anomala, is now reported equally commonly associated with Scolytus praeceps and S. subscaber beetle broods. Field inoculations have shown S. anomala to be definitely pathogenic and capable of killing the cambial region of white firs, as was previously demonstrated for T. suphicition. Physiological tests made demonstrated for T. symbioticum. Physiological tests made in the laboratory and field did not reveal significantly different influences on the growth of the 2 fungi. In most tests T. symbioticum grew faster than S. anomala. There was no indication that environmental conditions favored the establishment of the one fungus over that of the other, and it seems most likely that the respective staining fungi occur in separate parts of the infested trees only because they are introduced there by the specific beetles. Spicaria anomala reduces the water content of the infected wood to less than half that of unstained wood, and T. symbioticum to about \(\frac{2}{3}\). The drying of the infected wood and the killing of the cambium may be beneficial to the respective beetle broods, indicating a definitely beneficial relationship between the beetles and the staining fungi.—E. Wright.

1429. YAMAMOTO, WATARO. Some sooty moulds on sugar cane. [In Jap. with Eng. summary.] Ann. Phytopath. Soc. Japan 8(2): 95-112. 2 fig. 1938.—In Formosa several kinds of sooty moulds occur on sugar cane leaves, almost intermingling, accompanied by the aphid, Ceratovacuma lanigera. The author distinguished 3 spp. of sooty moulds by studies of single-spore cultures of the materials collected on affected sugar cane leaves. The olivaceous sooty mould is identified as Fumago vagans; the black sooty mould is Caldariomyces fasciculatus; the brownish sooty mould is an unidentified species of Hypocapnodium. Cultural characters on several media are described. Inoculation exps. on sugar cane leaves were positive—the leaves showed distinct lesions with conidium formation.—Y. Tochinai.

DISEASES CAUSED BY BACTERIA

1430. VALETTE, GUILLAUMIE. La formation de pigment dans les cultures de Bacillus subtilis sur pomme de terre. Compt. Rend. Soc. Biol. 128(18): 360-362. 1938.— Addition of minerals to media shows that the pigment formation of B. subtilis on potato is related to its mineral content, particularly iron. The ions of SO₄ favor pigment formation, those of Cl⁻ and NO₂ inhibit it.—M. C. Johnstone.

DISEASES CAUSED BY ANIMAL PARASITES

1431. FRANKLIN, M. T. Experiments with cysts of the potato eelworm (Heterodera schachtii) of different ages. Jour. Helminthol. 16(2): 67-76. 4 pl. 1938.—Since embryonated eggs of the potato strain of the eelworm are protected by a cyst and are capable of lying dormant for long periods of time without hatching, and inasmuch as they hatch only in the presence of the host plant, exps. were conducted for hatchability of eggs and for the rate of penetration into the roots by the larvae from cysts taken from soil in which potatoes had not been grown for 1, 2, 3, 4, 5, 7 and 8 years. Three potato plants grown from sets of equal size were transplanted to small pots of sterilized soil that had been inoculated with about 200 eggs per cc. of soil. Plants were removed after 3, 5 and 7 days' exposure

to the larvae and examined for invasion of the roots. On the whole, invasion of roots by the one-year old cysts occurred more quickly and in greater numbers, causing greater injury than the later attacks from older cysts which require longer to hatch. Severe eelworm sickness may appear even though as long as 8 years elapse between crops.-O. W. Olsen.

1432. GOODEY, T. Observations on Anguillulina millefolii (Low, 1874) Goodey, 1932, from galls on the leaves of yarrow, Achillea millefolium L. Jour. Helminthol. 16(2): 93-108. 1 pl., 8 fig. 1938.—The morphology of the adults and larvae of the parasites is given in detail. Life history studies indicate that there is but a single crop of galls appearing continuously on the leaves from May to Sept., often with 2 generations of worms in a single gall. Infective larvae set free from the galls as early as July probably do not give rise to new galls until the following year. Galls removed from the plants and dried for 6 weeks, 9 months and 15 months yielded only living infective larvae, all the other stages having died. The parasite utilizes the following plants as hosts: Achillea millefolium, A. tanacetifolia, A. nobilis, A. clavennae, A. moschata. It has been reported occurring in Austria, Czechoslovakia, Denmark, England, Finland, France, Germany, Switzerland and Sweden.—O. W. Olsen

1433. HURST, RICHARD H. On the relative distribution of cysts of Heterodera schachtii and a chemical dressing incorporated with infected land by means of a rototiller. Jour. Helminthol. 16(1): 57-60. 1938.—Soil infested with cysts of H. schachtii was treated twice with Ca cyanamide at 40, 60, and 80 cwt./acre; control plots with (NH₄)₂SO₄, 80 cwt./acre plus hydrated lime, 63 cwt./acre, equivalent in N and lime to 80 cwt. of CaCN₂, and rototilled to depths of 4-5 and 8-9 in. resp. Tests of soil taken 9 days later, during which no rain fell, showed penetration of the chemical to about 6 in., a position occupied by most of the cysts. The chemical was lethal to the contents of the cysts only in the upper portions treated with CaCN2 and (NH4)2SO4 at 4 tons/acre. Fewer larvae hatched in plots treated with 40 cwt. of CaCN2 than in control plots. Larvae receiving a sublethal amount of CaCN2 are stimulated to hatch. These results indicate that beneficial results are not likely to be attained in the treatment of soil over a period of several years .- O. W. Olsen.

VIRUS DISEASES

1434. AINSWORTH, G. C. A note on certain viruses of the cucumber virus 1 type isolated from monocotyledonous plants. Ann. Appl. Biol. 25(4): 867-869. 1 pl. 1938.—Three viruses of the cucumber virus 1 type, obtained from illy, hyacinth and tulip, are differentiated by the reactions of tobacco and cucumber plants. These viruses tend to remain localized in the test plants in which the type virus becomes systemic. The relationships of 3 viruses to each other and to previously described strains of cucumber virus 1 are briefly discussed.—G. C. Ainsworth.

1435. CALDWELL, J., and A. L. JAMES. An investigation into the "Stripe" disease of Narcissus. I. The nature and significance of the histological modifications following infection. Ann. Appl. Biol. 25(2): 244-253. 2 pl., 2 fig. 1938. —The wide variation in appearance of infected plants gives rise to the question whether the name "Stripe" is being applied to one or more diseases. The histological bases of the various types of symptoms are descr.: they are all produced by the same 3 factors acting with varying degrees of relative intensity. The disease is apparently caused by a virus complex having at least 3 components. Inclusion bodies in the cells of diseased plants are descr. which resemble the X-bodies associated with some virus diseases.— Auth. summ.

1436. CHOUARD, P., et J. DUFRENOY. Essais sur les conditions de contamination des pommes de terre par les maladies a virus en haute montagne. Bull. Soc. Nation.

Acclimation France 85(1/2): 40-44, 1938.

1437. FAWCETT, H. S. Development of psorosis (scaly bark) in relation to origin and history of various citrus varieties. California Citrograph 24(1): 6, 30-32. Illus. 1938.— This disease is believed to be of a virus nature and usually systematic in diseased trees. Substantial evidence indicates that none of the original California trees of the Washington

Navel and Valencia orange or Eureka and Lisbon lemon introduced this virus into the state. The virus was probably present in trees of some minor var. which were later topworked to other vars, and budwood from these topworked trees served to spread it into later plantings. The principal, or possibly the exclusive method of transmission in California appears to be by fusion of live cells of diseased and healthy

appears to be by itision of five cens of diseased and negative tissues.—C. S. Pomeroy.

1438. LORING, HUBERT S., MAX A. LAUFFER, W. M. STANLEY, F. C. BAWDEN, N. W. PIRIE, KENNETH M. SMITH, and W. D. MacCLEMENT. Aggregation of purified tobacco mosaic virus. Nature [London] 142(3601): 841-843. 1938.—The American workers present data, derived from a comparison of the activity, stream double refraction and filterability before and after ultracentrifugation of tobacco mosaic virus, which failed to confirm Bawden and Pirie's report that one sedimentation increased anisotropy of flow. Bawden and Pirie point out the inconsistencies might be explained by the differences in technique and emphasize the need for caution when interpreting centrifugal data while Smith and MacClement criticise the conclusions drawn from

the filtration exps.—E. Oyler.

1439. McWHORTER, FRANK P. The antithetic virus theory of tulip-breaking. Ann. Appl. Biol. 25(2): 254-270. 2 pl. 1938.—Tulip breaking is a virus disease. Breaking is as a rule induced by a mixture of 2 viruses—(1) tulip virus No. I, a color-removing virus, which inhibits chlorophyll formation, greatly restricts growth, and is directly responsible for the recognition of tulip-breaking as a disease, and (2) tulip virus II, or color-adding virus, which has no effect on the ground tissue of the flower or on the ground color, stimulates epidermal pigmentation, has no visible effect on the leaves, and has little effect on growth. These viruses are considered to be antithetic in the sense that one seems to function against the other in limiting the plant changes characteristic for each. Physically, they are very similar. Physically, they are antithetic. Broken tulips indistinguishable from commercial Rembrandts have been produced experimentally by inoculating with mixtures of the 2 viruses. Such tulips may be maintained in culture as long as the viruses remain in what may be termed a physiological balance. Some red tulips always self-break (i.e., show dark streaks of the normal color, but no loss of color) regardless of their virus content. In such cases some factor within the plant controls the type of break.-F. P. McWhorter.

1440. MARCKS FRANKE, HANS. Zur Physiologie der pflanzlichen Virose. Biochem. Zeitschr. 296(1/2): 149-152. 1938.—Kausche (Biochem. Ztschr. 294: 365. 1937) considered the author's earlier work on the physiology of tobacco-mosaic virus (Biochem. Ztschr. 293: 39. 1937) as questionable or non-essential. The author questions the validity of comparing Kausche's results on the x- and yviruses with those on tobacco-mosaic because of: (1) the thermo- and desicostability of the latter in contrast to the former, (2) the restriction of Kausche's pH titrations to the alkaline range, while the isoelectric point of tobacco-mosaic virus protein is 3.4, and (3) the impossibility of comparing redox-potentials measured by the different methods used by

the two investigators.—K. S. Chester.

1441. SALAMAN, R. N., et al. A discussion on new aspects of virus disease. *Proc. Roy. Soc.* [London] Ser. B 125(840): 291-310. 1938.—Critical discussions by R. N. Salaman, K. M. Smith and W. D. MacClement, F. C. Bawden, J. D. Bernal, A. S. McFarlane, G. M. Findlay, M. A. Watson, P. A. Murphy, and W. J. Elford of recent advances in the study of animal and plant viruses, with particular reference to the latter.—F. V. Rand (courtesy Exp. Sta. Rec.).

1442. SHEFFIELD, F. M. L. Vein clearing and vein banding induced by Hyoscyamus III disease. Ann. Appl. Biol. 25(4): 781-789. 1 pl., 3 fig. 1938.—The first symptom of Hy. III disease in tobacco is a clearing of the veins. This is followed later by vein banding. During clearing no anatomical or cytological abnormalities occur. The yellow color is due to a retardation of chlorophyll formation. When vein banding becomes apparent considerable hypermarks is seen in the tissues near the veins and hymoplesis. trophy is seen in the tissues near the veins and hypoplasia is apparent in the interveinal areas. Intracellular inclusions are abundant in all tissues except the xylem. Cleared tissue centains 6-11 times as much virus per unit volume as does

the banded tissue. The latter also contains less than do the yellower parts of banded leaves.-F. M. L. Sheffield.

1443. STOREY, H. H., and R. F. W. NICHOLS. Studies of the mosaic diseases of Cassava. Ann. Appl. Biol. 25(4): 790-806. 2 pl., 1 fig. 1938.—The symptoms of mosaic disease in cassava, although generally typical of the mosaic group, show wide variations, due in part to the varietal reaction of the plant, to its stage of development and to the environment. The most important cause of variations is differences in the strains of the virus, of which 2 groups of severe and mild strains are recognized by the symptoms. The viruses are transmitted across a graft; mechanical transmission by needle or hypodermic injection was not obtained. A Bemisia sp. can transmit both groups of strains. It can inoculate the plant only through immature leaves, less than about ‡ of their full length. The virus so inoculated does not pass out of the leaf until about 8 days have elapsed. On the basis of this knowledge a convenient and reliable single-leaf cage technique has been developed. After the virus has entered the stem it passes rapidly to the base of this stem, but only slowly into side branches from it or into other stems arising from the same original cutting. Infection of a plant with a mild strain of virus failed to confer immunity from infection by severe strains introduced by grafting. If the severe strains were inoculated by insects there was an indication of some conferred resistance but this was insufficient to make the procedure useful in control.-H. H. Storey.

1444. WYCKOFF, RALPH W. G. Le poids moléculaire des virus-protéines des plantes. Compt. Rend. Soc. Biol. 127(14): 1396. 1938.—The mol. wt. of the viruses of tobacco mosaic and cucumber mosaic was detd. by means of the ultracentrifuge. Sedimentation occurred at a force ranging from 175 × 10⁻¹³ cm. sec. dynes to 115 × 10⁻¹³. This would make the mol. wt. about 8 or 9 millions while the molecular weight of the normal plant protein was 3 or 4 millions.-

 $J.\ reve{T}.\ Myers.$

NON-PARASITIC DISEASES

1445. ADAM, D. B. The injury of grapevines by lightning strike. Jour. Australian Inst. Agric. Sci. 4(3): 162-164. Illus. 1938.

1446. KIDD, FRANKLIN, and CYRIL WEST. Spotting and other effects on apples in storage due to volatile products from ripe apples of other varieties stored with them. Jour. Pomol. and Hort. Sci. 16(3): 274-279. 6 fig. 1938.—Apples of late maturing vars. when stored with earlier ripening vars. were subject to spotting of a characteristic type similar to that caused by ethylene (1:500). Their rate of ripening, however, was not accelerated as with ethylene. The degree of spotting varied with the var. stored. There was no effect on the development of scald traceable to the presence of the ripe vars. of apples stored with the less ripe vars. indicating that gasses causing scald are probably given off only in the less ripe stages of development.—E. L. Overholser.

1447. NĚMEC, ANTONÍN. Dalši příspěvek k seznání karenčních zjevů n semenáčků a zakrnělých kultur borovice. [Chlorosis of seedlings and stunted plantations of Scotch pine.] [With Ger. and Fr. summ.] Lesnická Práce 17(7/8): 388-402. 6 fig. 1938.—Yellowing of foliage was most serious on acid soil deficient in assimilable K and Mg compounds. Chem. analysis of needles and wood showed a lack of K and Mg and an excess of Mn. The excess Mn probably checks photosynthesis and hence plant growth by preventing formation of chlorophyll. The remedy is application of K and Mg fertilizers, with lime.—W. N. Sparhawk.

1448. ORTON, C. R., and L. M. HILL. Further observations on "blue stem" of potato. Amer. Potato Jour. 15(3): 72-77. 1 fig. 1938.—The symptoms of blue stem were compared with those of other potato diseases. Exps. involving caging, shading, and walling off of plants from diseased seed show that the disease is not transmitted through the tubers. One yr.'s. results with plants walled with muslin 6 ft. high showed a decrease from 35 to 7 in the % of the disease. A higher % of disease appears along the borders of the fields. Temp., moisture, altitude, and soil types do not show any noticeable differences in the occurrence of blue stem.— $C.\ R.\ Orton.$

PARASITISM AND RESISTANCE

1449. IWATA, YOSITO. Studies on the penetration phenomena in Pseudoperonospora cubensis Berk. et Curt. IIn Jap. with Eng. résumé.] Ann. Phytopath. Soc. Japan 8 (2): 124-144. 6 fig. 1938.—Aerial conidia in water drops on a slide form zoospores within 1 hr. at 20°C. On the leaves of the host plant most of the zoospores encyst on the stomata, and the germ tubes invade through the stomatal pore. The penetrating hypha swell in the substomatal cavity, forming substomatal vesicles. When the infection hypha developed from the vesicle reaches the parenchymatous cell, it extends an haustorium into it. Penetration through stomata was observed on the cotyledons, but not on the petioles, stems and hypocotyls. From experimental inoculations of 73 spp. of phanerogams of 32 families, including 11 cucurbits and 1 fern, entrance through the stomata occurred in 49 dicotyledonous plants of 22 families (the specific names of the plants examined and the results of the inoculations are fully tabulated).—Y. Tochinai.

1450. KREUTZER, W. A. Invasion of onion roots by Phoma terrestris Hansen. Jour. Colorado-Wyoming Acad. Sci. 2(4): 25. 1938.—This "pink root disease" has made certain fields in Colorado unfit for onion culture. Early stages of parasitism show colony-like growths which later develop into girdling mycelial mantles. Both mechanical and enzymic action are characteristic of invasion.—F. Ramaley.

1451. PRATT, ROBERTSON. Respiration of wheat infected with powdery mildew. Science 88(2272): 62-63. 1 fig. 1938.—Infection of wheat leaves by Erysiphe graminis tritici markedly increased the rate of O₂ consumption.—F. V. Rand (courtesy Exp. Sta. Rec.).

1452. WALKER, J. C., R. H. LARSON, and A. R. ALBERT. Studies of resistance to potato scab in Wisconsin. Amer. Potato Jour. 15(9): 246-252. 1938.—Field tests were made with a number of standard and new vars. of potatoes on 3 types of soils infested with Actinomyces scabies in 3 locations in Wisconsin over a 3-year period from 1935 to 1937, inclusive. Trials were laid out in single-row plots in randomized order each block being replicated 4 times. The potatoes when harvested were divided into 4 groups severely, moderately and slightly scabbed and clean. On this basis a scab index was calculated for each plot and the minimum difference for significance was detd. by the analysis of variance method. The usually accepted range of resistance between standard vars. did not always hold, widely different results being produced from season to season. When conditions were moderately favorable for the disease the customary range of resistance in standard vars. was evident; when conditions were very favorable for the disease vars. commonly accepted as commercially resistant, e.g., Russet Burbank, showed scab indices not significantly different from those of very susceptible vars. such as Katahdin. In the development and testing of new strains of potato, testing plots should be set up in several locations and soils.—Authors.

1453. WILLIAMS, P. H. Investigations on the rust of roses, Phragmidium mucronatum Fr. Ann. Appl. Biol. 25 (4): 730-741. 1938.—Rosa laza and certain vars. of R. canina were not attacked by Phragmidium mucronatum from the cultivated rose. Schmidt's Special, was slightly infected. The rose was resistant to strains from R. canina, but attacked by strains from R. laxa and R. rugosa. The rust on the rose also differed in the size of the teleutospores from that on the briars. Teleutospores, for germination, require preliminary exposure to winter conditions.—P. H. Williams.

DISEASE CONTROL

1454. BREWER, E. G., and WILLIAM MIDDLETON. Dutch elm disease eradication; Japanese beetle control; European corn borer and gypsy moth certification. Jour. Econ. Ent. 31(5): 577-583. 1938.—Pronounced decreases in the number of confirmations of Ceratostomella ulmi during the 1937 foliar season, coincident with earlier and more intensive scouting, afford a basis for continued optimism in the general outlook for the work directed against this disease. During 1937, 6,128 elms were confirmed as infected with the disease. Scouting for the Japanese beetle, Popillia japonica, in 1937 was characterized by the apparent eradi-

cation of the insect in St. Louis, an unusual reduction in the Chicago infestation and the scarcity of first-record infestations of an established nature—Authors

tions of an established nature.—Authors.

1455. CLAYTON, E. E. Paradichlorbenzene as a control for blue mold disease of tobacco. Science 88(2272): 56. 1938.—
Tests here reported appear to indicate that paradichlorobenzene as a substitute for liquid benzol may be a distinct advance toward making the gas treatment simpler to use and hence more practical.—F. V. Rand (courtesy Exp. Sta. Rec.)

1456. CLAYTON, EDWARD E., JOHN G. GAINES, T. E. SMITH, W. M. LUNN, and K. J. SHAW. Control of the blue mold (downy mildew) disease of tobacco by spraying. U. S. Dept. Agric. Tech. Bull. 650. 1-22. 5 fig. 1938.—Blue mold or downy mildew (Peronospora tabicina), attacks tobacco plants in seedbeds causing defoliation and outright death of plants. In addition, losses are caused by the delay in maturity resulting from late set plants, and plants weakened by the disease often produce poor stands. Bordeaux mixture and many other fungicides failed effectively to control blue mold. Colloidal Cu, Cu-soap, and Ca monosulphide were all superior to bordeaux mixture, but not effective enough to be recommended. A combination of cuprous oxide with emulsified cottonseed oil was distinctly superior to any of the preceding. The epidemic blue mold outbreak of 1937 offered an opportunity to test thoroughly the value of this control. Beds were sprayed twice weekly and spraying was continued until the plants were set out or the disease became inactive. The max. number of applications required under 1937 conditions was about 15. Applications required under 1937 conditions was about 15. pearance of mold was usually delayed, development of the disease was greatly delayed, and severity of disease attack was greatly minimized, by spraying. The max plant mortality in any sprayed bed was 16%, and under these same conditions plant losses in the unsprayed checks ranged up to 94%. In only 2 sprayed beds were more than 5% killed, and in the majority of beds no plants were killed, while in the majority of check beds from 20 to 50% of the plants were destroyed. The period of active disease development in sprayed beds was never more than 4 days, after which recovery was prompt and complete, and there was little transplanting delay. In the check beds, mold was active up to 3 wks. and transplanting was delayed for 10 days to 5 wks. Mold in sprayed beds represented no field hazard, since field stands were uniformly good, even when the plants were set out at the time the disease was most active. Spraying was effective under severe disease conditions, and max, gains were obtained when the need was greatest. On the average, from $2\frac{1}{2}$ to $3\frac{1}{2}$ acres of tobacco were set from each 100 sq. yards of sprayed tobacco bed during the normal transplanting season; from unsprayed beds the transplantings ranged from 0 to $1\frac{1}{3}$ acres.—E. E. Clayton.

1457. COLE, J. R., and J. R. LARGE. Results of three years' spraying with low lime Bordeaux mixture for the control of pecan scab. *Proc. Ann. Convention Southeastern Pecan Growers Assoc.* 32: 28, 30, 32-35, 38, 40. 1938.

1458. CROSIER, W. F. Abnormal germination of wheat caused by organic mercurials. Proc. Assoc. Offic. Seed Analysts North America 23/26: 284. 1930/33[1938].—From a case of injury described it is concluded that under improper storage conditions seed treated with Ceresan may be permanently damaged, and careless handling of the seed, especially when severe cracking of the seed coats results, may also be a factor conducive to chemical injury.—F. V. Rand (courtesy of Exp. Sta. Rec.).

1459. Du PLESSIS, S. J. Further studies on the control of Botrytis rot in grapes. Union S. Africa Dept. Agric. and Forest Bull 166 1.32 1937

1460. EDWARDS, E. E. Investigations upon the control of oat sickness by the addition of certain chemical substances to soil infected with Heterodera schachtii Schmidt. Ann. Appl. Biol. 25(4): 855-866. 1 pl. 1938.—An account is given of pot exps. carried out in triplicate in 1936 and 1937 upon the control of the oat sickness associated with the root eelworm, H. schachtii. Calcium cyanamide, (CaCN₂), NaNO₃, FeSO₄, FeCl₃ and two forms of ferric oxide were incorporated intimately with infected soil, and quantitative observations were made on the effects of the treatments upon oats grown in the soil in 1936 and 1937 with regard to (a) germination, (b) vegetative growth, (c) panicle

production and yield of grain, and (d) degree of infestation of the roots by the nematode. All the dressings produced better growth of the plants, at least in the 1st yr. after application; CaCN₂ alone yielded significant results. Of the treatments tested, only the use of CaCN2 at the rate of 100 cwt./acre protected the plants completely from oat sickness in both years and, at the same time, apparently eradicated the parasite from infected soil. Such heavy dressings are not practicable except, perhaps, under special circumstances. E. E. Edwards.

1461. EDWARDS, W. H. Report on an agricultural survey in the Cayman Islands, with notes on the control of the more important pests and diseases which were found attacking economic plants in that dependency of Jamaica.

Bull. Dept. Sci. and Agric. Jamaica 13, 1-40, 6 pl. 1938. 1462. FRACKER, S. B. Present status of barberry eradication and white pine blister rust control. Jour. Econ. Ent. 31(5): 591-594. 1938.—Barberry eradication for the control of black stem rust of grains (Puccinia grammis) has made so much progress in 6 Plains States including the Dakotas, Nebraska and Eastern Colorado, that need for labor for the strip scouting phase of the program will soon be past. In the Upper Mississippi and Ohio Valley States and the Lake States, barberries are still being found in considerable numbers. Recently similar work has been undertaken in Missouri, Pennsylvania, Virginia, West Virginia and western Colorado, where special problems are being met, owing largely to the occurrence of large numbers of Berberis canadensis and B. fendleri. In connection with the blister rust control project, additional findings have recently been made in California, and spread southward into the Southern Appalachian region is also reported. More than 20,000,000 acres of forested area have received initial protection against blister rust (Cronartium ribicola) since 1918 by the eradication of over 700,000,000 Ribes plants. The greater part of this work as well as of the black stem rust control project has been financed from emergency unemployment appropriations .- S. B. Fracker.

1463. HASSEBRAUK, K. Beiträge zur chemischen Bekämpfung von Rost auf Kulturpflanzen. Angewandte Bot. 20(5): 366-373. 1938.—A general discussion of the control of rusts by chemical means, with special emphasis on work done by the author and others at Brunswick.—T. Johnson.

1464. HENRY, A. W., and J. A. CAMPBELL. Inactivation of seed-borne plant pathogens in the soil. Canadian Jour. Res. Sect. C. Bot. Sci. 16(9): 331-338. 1938.—Certain seedborne pathogens are inactivated to a marked degree when infested seed is sown in natural soil. Polyspora lini and Colletotrichum lini, the fungi causing respectively the Browning and Anthracnose diseases of flax, are so affected, both when naturally and artificially infested seed is used. This appears to be due largely to the antibiotic action of the micro-organisms of the soil, since in sterilized soil similar seed produces significantly higher percentages of infection. Infection may be reduced as much or more by this means as by seed treatment with certain fungicides. Some seed-borne pathogens apparently are not inactivated to such an extent as to produce consistently less disease in natural than in sterilized soil. This has been indicated by preliminary exps. with certain smut fungi, e.g., those causing bunt of wheat. Auth. abst.

1465. HURST, R. H. Pot experiments on the chemical treatment of soils infected with the potato and oat strains of Heterodera schachtii. Jour. Helminthol. 16(2): 61-66. 1938.—Since the lethal action of dilute solns. of CaCN₂ on H. schachtii larvae of the potato strain is greater when slightly acid, exps. were made to determine the effect of acidifying soil by applying pyroligneous acid (4% acetic acid) immediately following the CaCN₂. Acetic acid is more toxic than mineral acids, likewise ammonia solns. more than caustic soda, a phenomenon apparently associated with their ready vaporization. Exptl. pots containing 20 cwt. acetic acid (as pyroligneous acid) per acre, 10 cwt. each of acetic acid and CaCN₂, and 20 cwt. each of acetic acid and CaCN: per acre were planted with a seed potato after having been kept moist for 3 weeks. All treated pots showed fewer newly formed cysts than the controls and the 20 cwt. per acte pot having fewest with the acetic acid alone next. Powdered CaCN, is a more effective larvicide than the granular. In the case of the oat strain of H. schachtii, parallel

exptl. pots were prepared with 1, 2, 3, 4, and 5 tons per acre of CaCN₂ and with (NH₄)₂SO₄ and lime, both with similar Ca and N contents. Germination was either much retarded or failed entirely in all the CaCN2 pots except the 1 ton per acre which showed an average of 15 cysts per pot. In the (NH₄)₂SO₄ pots germination was normal and growth excellent in the 1 and 2 tons per acre, but much retarded in the heavier dressings and with 3 cysts per pot. No cysts were

neavier dressings and with 3 cysis per pot. No cysis were found in pots receiving 2 tons per acre or more. Controls showed poor growth and 5 cysts per pot.—O. W. Olsen. 1466. HYLAND, MALCOLM C. Some experiments in biophysics. Jour. Colorado-Wyoming Acad. Sci. 2(4): 18. 1938.—Bulbs of tulips affected with a Botrytis, a disease which causes a breaking down of flower colors, were given X-ray doses of 1,500-12,000 r. in an attempt to kill the parasite. In the first season after treatment no effect was parasite. In the first season after treatment no effect was

noticed.-F. Ramaley.

1467. JONES, G. HOWARD, and ABD el GHANI SEIF el NASR. Control of four smut diseases by regulation of planting method under irrigation. Nature [London] 142(3603): 917-918. 1 fig. 1938.—The amounts of flag smut and bunt of wheat, covered smut of barley and grain smut of millet in Egypt differ greatly according to the method of planting. The factors involved are depth of planting and, to a less extent, soil moisture. A method of "mud sowing" has been developed where seed is sown on the surface of soaked soil which gives early tillering and good disease control.—E.

Oyler. 1468. KADOW, K. J. Recent developments in the control of vegetable diseases with special reference to greenhouse Part Vegetable Growners Assoc. Amer. 1938: culture. Ann. Rept. Vegetable Growers Assoc. Amer. 1938:

77-87, 1938,

1469. KEARNS, H. G. H., R. W. MARSH, and H. MARTIN. Combined washes. Progress report. IV. The phytocidal properties of petroleum oil sprays alone and in combination with lime-sulphur. Ann. Rept. Agric. and Hort. Res. Sta. Univ. Bristol 1937: 65-77. 1937(1938).

1470. LYLE, E. W., and L. M. MASSEY. Control of stem and graft canker of the rose. Amer. Rose Ann. 1938: 142-145. 1 fig. 1938.—Stem and graft cankers (Coniothyrium fuckelii) result in the death of parts or of entire plants. The fungus is a wound parasite not penetrating far beyond the limits of visible cankers. The disease may be controlled by removing diseased parts, making the cut at any node below the visibly diseased area.—F. V. Rand (courtesy of Exp. Sta. Rec.)

1471. MILLER, P. W. Sprays control blight on walnuts. Better Fruit 32(12): 14, 15. 1938.—3 applications of bordeaux mixture made, respectively, in the early prebloom, late prebloom, and early postbloom stages were needed under most conditions. The 8-5-50 formula proved most effective. The set of nuts was not reduced by the spray treatments, but the 2-2-50 mixture induced injury when applied to young leaves. The severity of foliage injury diminished with decreasing amounts of lime, up to the neutral point. Thorough and

amounts of lime, up to the neutral point. Thorough and timely spraying gave satisfactory control in commercial orchards.—F. V. Rand (courtesy Exp. Sta. Rec.).
1472. OGILVIE, L., C. J. HICKMAN, and C. L. WALTON. The effect of fertilisers on peas affected with "pea sickness." Pot experiments. Ann. Rept. Agric. and Hort. Res. Sta. Univ. Bristol 1937: 118-126. 1937(1938).
1473. PORTER, R. H. Detection of seed borne parasites. Proc. Assoc. Offic. Seed Analysts North America 23/26: 218-222. 1930/33[1938].—This is a general summary of several vears' germination tests and studies of seed-borne diseases years' germination tests and studies of seed-borne diseases of various crop plants.—F. V. Rand (courtesy of Exp. Sta. Rec.).

1474. SOUTHERN, B. L. Copper bunticide standards. Jour. Australian Inst. Agric. Sci. 4(3): 160-161. 1938.
1475. WHITE, H. L. The sterilization of lettuce seed. Ann. Appl. Biol. 25(4): 767-780. 1 pl. 1938.—Chemical sterilizing agents, as applied commercially to cereal seed, have damaged lettuce seed severely. Satisfactory sterilization of the latter is not effected by CuSO, or formalin; prepns. containing Hg are highly toxic. Sterilization with Ca hypochlorite is safe and efficient. Treatment with Ca hypochlorite prior to sowing accelerates germination. The viability of lettuce seed sown on filter paper or in soil is not affected; that of seed sown in contact with a film of agar, which is subject to poor aeration and shows exceptionally

poor capacity for germination, is markedly increased by previous treatment with Ca hypochlorite. Both these effects are independent of germicidal action upon organisms present on the seed and are considered to result from increase of O₂ supply. Susceptibility of lettuce seed to injury from germicides is a varietal characteristic. Fresh seed with strong viability is more resistant to injury from germicides than older seed of less vigor.—H. L. White.

MISCELLANEOUS

1476. KIRYU, T. Studies on the physiological characters of Cercospora vaginae Krüg. [In Jap. with Eng. summ.] Rept. Gov't Sugar Exp. Sta. Tawain, Formosa 5: 53-72. 2 pl. 1938.

1477. McINTOSH, T. P. Potato notes. Scottish Jour. Agric. 21(4): 374-376. 1938.—Describes certification grades and correct roguing of crops. Two types of Witch's Broom are described, both ascribed to virus infection. Tuber variations which remained constant in vegetative reproduction were produced by eye-excision, new growth being induced from deeper tissues; normal Arran Victory was recovered thus from variations of this kind.—C. E. Foister.

1478. OGILVIE, L., and C. J. HICKMAN. Progress report on vegetable diseases. IX. Ann. Rept. Agric. and Hort. Res. Stat. Univ. Bristol 1937: 96-109. 1937(1938).

1479. PHIPPS, I. F. The effect of leaf-rust on yield and baking quality of wheat. Jour. Australian Inst. Agric. Sci. 4(3): 148-151. Illus. 1938.

1480. PORTER, R. H. Pathological aspects of seed testing. Proc. Assoc. Offic. Seed Analysts North America 23/26: 128-131. 1930/33[1938].—This is a brief summary of the results of many years of seed germination tests and studies of seed-borne fungus parasites with special reference to corn, but with data also on small grains, vegetable crops, and potato seed tubers. The determination of resistance to specific diseases by greenhouse tests is referred to. With respect to corn it was significant that most of the dead and weakly germinating kernels were infected, while those with strong germination were largely free from dry rot organisms. Early picked corn sorted over in the spring to remove poor ears, when seed-treated, gave practically as high a yield as nearly disease-free seed either treated or untreated. Early picking, careful drying, and storage in a dry place are

picking, careful drying, and storage in a dry place are advocated.—F. V. Rand (courtesy of Exp. Sta. Rec.).

1481. REPORT OF THE 1938 ANNUAL MEETING OF THE SOUTHERN DIVISION OF THE AMERICAN PHYTO-PATHOLOGICAL SOCIETY. Phytopath. 28(9): 662-668.

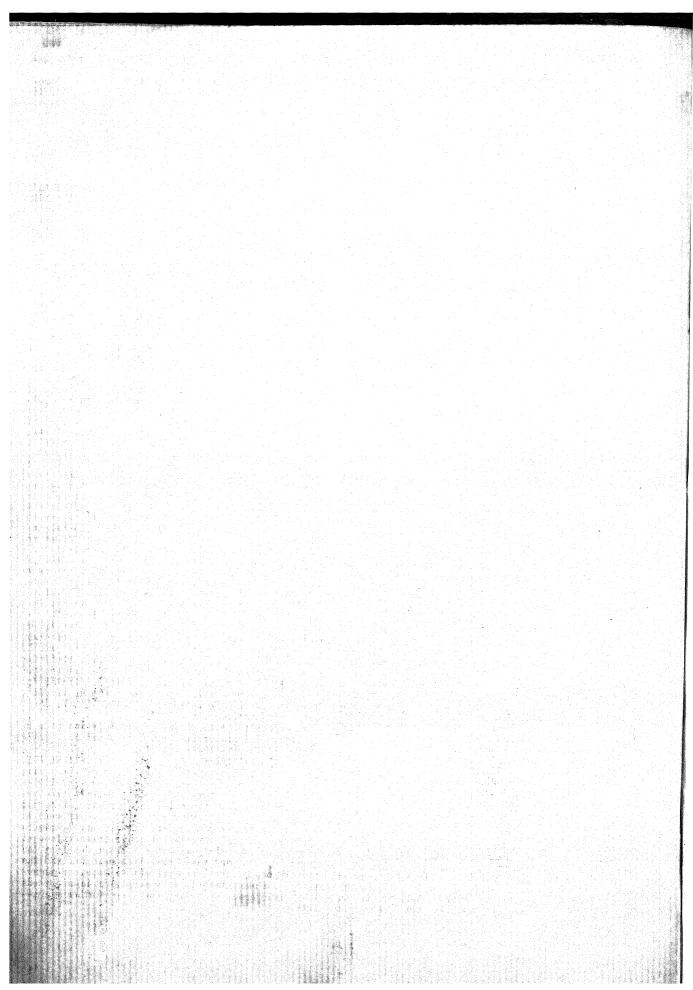
1938.—Abstracts of the following papers are included: Eye Spot of Napier Grass, by R. K. VOORHEES (p.663); Leaf Blights of Fig in Louisiana, by E. C. TIMS and P. J. MILLS (p.663); Problems in the Germination of Cottonseed, by D. M. SIMPSON and G. M. STONE (pp.663, 664); Lightning Injury to Cotton, by A. L. SMITH (p.664); Comparative Injury of Root-knot Nematodes to Different Varieties and Species of Cotton in Control Experiments Under Irrigation, by C. J. KING (p.664); Further Studies of Crinkle Leaf, a Disorder of Cotton Plants Prevalent in Lintonia and Olivier Silt-loam Soils in Louisiana, by D. C. NEAL and H. C. LOVETT (p.664); Results of Seedtreatment tests with Cotton in 1937, by S. G. LEHMAN (pp.664, 665); Results from Treating Cottonseed with 2 Per Cent Ceresan, by U. R. GORE (Ga. Expt. Sta.) (p.665); Cottonseed Treatment for Stand Improvement, by D. C. NEAL (p.665); Cottonseed Treatment Gives Larger Yield, by W. C. NETTLES (p.665); The Reaction of Cotton Leaves to Hypodermic Injections of Fusarium vasinfectum, by A. L. SMITH (pp.665, 666); Technique of Artificial Inoculation with Fusarium vasinfectum, by D. C. NEAL (pp.666, 667); Air-dried Oat-wheat Mixture for Contaminating Soil with the Cotton-wilt Organism, Fusarium vasinfectum, by A. L. SMITH (p.666); A Promising Wiltresistant Long Staple Cotton, by D. C. NEAL and C. B. HADDON (p.666); Fertilizers in Relation to Incidence of ICotton Wilt as Affecting a Resistant and a Susceptible Variety, by J. B. DICK and H. B. TISDALE (p.666); Cotton Varieties in Relation to Cotton Wilt, by H. B. TISDALE and J. B. DICK (p.667); Field Studies on Fusarium Wilt of Cotton in Arkansas—The Relation of

"Wilt" and "Total Infection" as Influenced by Potash Fertilization, by E. M. CRALLEY and W. H. THARP (p.667); The Effect of Heavy Metals and Minor Elements upon the Growth of Phymatotrichum omnivorum in a Nutrient Solution, by L. M. BLANK (p.667); Some Studies on Phymatotrichum Root Rot, by W. N. EZEKIEL, J. J. TAUBENHAUS, and J. F. FUDGE (pp.667,668); and Cotton Root Rot in Texas in 1937, and Conditions Affecting Its Local Prevalence, by W. N. EZEKIEL (p.668).—F. V. Rand (courtesy Exp. Sta. Rec.).

1482. REPORT OF THE TWENTY-SECOND ANNUAL MEETING OF THE PACIFIC DIVISION OF THE AMERICAN PHYTOPATHOLOGICAL SOCIETY. Phyto-AMERICAN PHYTOPATHOLOGICAL SOCIETY. Phytopath. 28(9): 668-674. 1938.—Abstracts of the following papers are included: Movement of the Virus of Sugar Beet Mosaic, by C. W. BENNETT (p.668); Serological Differentiation of Citrus Red Scale, Aonidiella aurantii and Citrus Yellow Scale, A. citrina, by F. R. BUSHNELL and L. J. KLOTZ (p.669); The Present Status of Curly-Top Resistance in Sugar Beets, by E. CARSNER (p.669); A Study of the Pathological Anatomy of Psyllid Yellows with Special Reference to Similar Changes in Sugar Beets Affected with Curly Top, by J. R. EYER and M. MILLER (p.669); Transmission of Psorosis of Citrus, by H. S. FAWCETT (p.669); Types and Symptoms of Psorosis and Psorosis-like Diseases of Citrus, by H. S. FAWCETT and L. J. KLOTZ (p.670); Effect of Sodium Citrate on Release of Curly-top Virus from Alcoholic Precipitate of Plant Juice, by J. M. FIFE (p.670); Studies of Selected Strains of Curly-top Virus, by N. J. GIDDINGS (p.670); Species of Sclerotinia causing Brown Rot of Deciduous Fruits in California and Their Distribution, by W. B. HEWITT and fornia and Their Distribution, by W. B. HEWITT and L. D. LEACH (p.670); Inheritance in Cucumis melo of Resistance to Powdery Mildew (Erysiphe cichoracearum), by I. C. JAGGER, T. W. WHITAKER, and D. R. PORTER (p.671); The Nature of Water Damage to Citrus Fruits, by (p.671); The Nature of Water Damage to Citrus Fruits, by L. J. KLOTZ (p.671); Curly-top Virus in Root Tips of Sugar Beets and Beans, by G. F. LACKEY (p.671); Seed Treatment for the Control of Damping Off [Pythium sp., Rhizoctonia solani, and Phoma betae] of Sugar Beets in Northern California, by L. D. LEACH and B. R. HOUSTON (pp.671, 672); Pythium [spp.] Disease of Fibrous-rooted Begonia, by J. T. MIDDLETON, C. M. TUCKER, and C. M. TOMPKINS (p.672); Cucurbit Powdery Mildew on Carica papaya, by P. A. MILLER (p.672); Diseases of Ornamental Plants in Southern California, by P. A. MILLER mental Plants in Southern California, by P. A. MILLER (p.672); Susceptibility of Cupressus and Allied Species to Crown Gall, by C. O. SMITH (pp.672, 673); Pink Disease, a Bacteriosis of Pineapple Fruits, by C. H. SPIEGELBERG (p.673); A Nursery Blight of Citrus Caused by Phytophthora citrophthora, by R. B. STREETS (p.673); A Root Rot [Fusarium?] Disease of Citrus, by R. B. STREETS (p.673); Control Measures for Phymatotrichum Root Rot of the Pecan, by R. B. STREETS and L. BRINKERHOFF (p.673); Effects of Soil Treatments for the Control of Phymatotrichum Root Rot on the Soil and the Pecan, by R. B. STREETS and L. BRINKERHOFF (p. 674); and Acquired Tolerance of Curly Top in Nicotiana tabacum, by J. M. WALLACE (p.674).—F. V. Rand (courtesy of Exp. Sta. Rec.).

1483. STRICKLAND, A. G. Vine diseases and pests in the Murray irrigation area. Jour. Dept. Agric. S. Australia 42(2): 128-134. Illus. 1938.

1484. VANTERPOOL, T. C., and P. M. SIMMONDS. The relation of browning root rot to stem rust in causing injuries to wheat. Sci. Agric. [Ottawa] 19(2): 81-82. 1938.— The 1938 wheat stem-rust (Puccinia graminis tritici) epidemic in Saskatchewan afforded an opportunity of testing the significance of browning root rot (Pythium spp.) in delaying the ripening of wheat and thus exposing the crop to stem rust damage. Data collected from a browning root-rot study-field showed that had it not been for this delay the amount of stem rust would have been negligible and the grain of good quality. This phase of root diseases in rendering affected plants more liable to subsequent injuries needs to be more generally realized and given further study.—



ECOLOGY

Editors

 W. C. ALLEE, Terrestrial Animal Ecology
 G. D. FULLER, Terrestrial Plant Ecology
 CHANCEY JUDAY, Hydrobiology (Oceanography, Limnology)

FREDERICK A. DAVIDSON, Ecology of Wildlife Management—Aquatic W. L. McATEE, Ecology of Wildlife Management— Terrestrial

(See also in this issue Entries [GENERAL AND ANIMAL ECOLOGY]: Sexual selections, 1693; Mosquitoes in Lappland, 3202; Sex reversal in oysters, 3296; Mite-sponge commensalism, 3313; Zoogeography of Madagascar, 3343; Host-induced modifications in scale insect, 3347; Flight capacity in grasshoppers, 3365; Invasion of fresh water by marine fauna, 3381; Ecol. of European Coregonidae, 3396. [PLANT ECOLOGY]: Spitzbergen algae, 2791; Fresh water Rhodophyceae, 2794; Floristic areas in Rhodesia, 2894; Phytogeography of Madagascar palms, 2899; Myrmecodia, 2916; Seleniferous soil of U. S., 2925; Climate effecting grapes, 3013; Micro-climatology of cotton fields, India, 2931; Nutrient elements in rainfall, 2938; Vegetation and plant communities of Belgium, 3026; Climate and vegetation of W. Germany, 3031)

GENERAL

1820. ÅLVIK, GUNNAR. Über Lichtabsorption Wasser und Algen in natürlichen Gewässern. Bergens Mus. Arbok Naturvidenskapelig Rekke 1937(2, paper 2): 1-63. 15 fig. 1937(rec'd 4-2-38).—The absorption of light in various natural waters in West Norway was studied by means of rectifier (selenium) photo-cells and glass color filters. The transmission for the total light (700-400 m μ) as thus measured was in the salt fjord water about 80% per metre, and in brown fresh water (humus water) about 35%. In the ovster-pools the transmission of total light was 30-80% per m. Ordinarily the surface fresh-water layer was optically distinguishable from the salt water lying below it in the pools. In the salt fjord water the maximum of transmission is for green light, around 530 m μ and in humus water in the red orange around 620 m μ , and is usually found between these limits. As the total transmission decreases the region of opt, transmission shifts from blue to red. Measurements were made of the light absorption of algae in different waters. Thus suspensions of Chlorococcum submarinum and Chroococcus limneticus, both oyster pool algae, showed high transmission around 720 mu and the former gave good transmission also at 580-560 mµ, but heavy absorption at 550-450. The latter gave a more uniformly decreasing absorption. Results are tabulated showing the relation between the transmission of various algal pigments and the water.-W. R. G. Atkins.

1821. BAYLISS, L. E. The photographic method for recording average illuminations. Jour. Marine Biol. Assoc. United Kingdom 23(1): 99-118. 3 fig. 1938.—The chief sources of error in the method are due to (a) the uncertainty of the wedge constant, and (b) the failure of the reciprocity law. P.O.P. emulsion is shown to obey the reciprocity law sufficiently closely for exposure times between 1 and 24 hr. Gaslight paper should only be used for exposure times less than 1 hr. When P.O.P. is used, and a sheet of diffusing glass is placed above the wedge, the value of the wedge constant is sensibly independent of the direction and quality of the incident light. P.O.P. has a maximum sensitivity to light of wave-length 480 m μ , gaslight paper to light of 370 m μ . Factors are evaluated for converting photographic measurements of illumination into visual units. The method has an exptl. uncertainty of about ± 5 to ± 10 p.c., but is sufficiently reliable for use in the field.—L. E. Bayliss.

1822. BLAIR, W. F., and T. H. HUBBELL. The biotic districts of Oklahoma. Amer. Midl. Nat. 20(2): 425-454. 1 fig. 1938.—Three major biotic areas—each with a distinctive Orthopteran and Mammalian fauna—occur in Oklahoma. The major biotic areas are divided into biotic districts, which are distinguished by characteristic physiographic features and plant associations, by characteristic species and races of Orthoptera and mammals, and by characteristic assemblages of species of Orthoptera and mammals. Thus the eastern deciduous forest in Oklahoma is divided into the Ozark, Ouachita, Mississippi, and Cherokee Prairie districts. The Great Plains grasslands are divided into the Mixed-grass Plains, Mesquite Plains, and Short-grass Plains districts. The southern Rocky Mountains are represented by the Mesa de Maya district. The Osage Savanna district is an area of transition from the eastern deciduous forest to the Great Plains grasslands. The

Orthoptera and mammals of Oklahoma agree in showing little north-south zonation, but marked east-west zonation, indicating that precipitation and not temp. is the most important factor controlling (although indirectly) the distribution of these groups in the state.—W. F. Blair.

1823. CHAPMAN, V. J. Studies in salt-marsh ecology. Sections I to III. Jour. Ecol. 26(1): 144-179. 18 fig. 1938.— The physiography, tides, behavior of the water table, the aeration of the soil and the drainage of some salt marshes are descr. in considerable detail. There are diurnal movements of the water table and also cyclic movements associated with spring tidal cycles. The upper soil layers always contain a definite aerated layer in which are the roots of the plants. The composition of the occluded gas varies considerably. The factors determining the diurnal movements are: height of tide, resistance of soil strata, strength and direction of wind, height of marsh, distance from creek and size of creek, difference in level between tide and watertable. Water movement is detd. by lateral seepage, downward drainage, surface evaporation, transpiration, and surface flooding.—V. J. Chapman.

1824. DARLINGTON, P. J. Jr. Was there an Archatlantis? Amer. Nat. 72(743): 521-533. 1 fig. 1938.—Three genera (Stylulus, Limnastis, and Perileptus) of Carabid beetles which have been cited by Jeannel as evidence of a Tertiary land bridge (Archatlantis) from the Old World to the West Indies, appear really to have crossed the Atlantic through the air, not over land. The minute size of the insects, the apparent E. to W. direction of their dispersal, and the fact that 2 of the 3 genera have relatives on the isolated Hawaiian Islands all point to dispersal by winds. Neither terrestrial vertebrates nor the most recent comprehensive geological study (of C. Schuchert) appear to yield any real evidence of a Tertiary Archatlantis. It is concluded that there was no such land bridge.—P. J. Darlington, Jr.

1825. MOHR, E. C. J. Climate and soil in the Netherlands Indies. Bull. Colon. Inst. Amsterdam 1(4): 241-251, 1938.

1826. WITOLD, ADOLPH. Frühjahrsaspekte der Bienen in Ponary bei Wilno. [In Polish with Ger. summ.] Trav. Soc. Sci. et Lettr. Wilno Cl. Sci. Math. et Nat. 11: 1-23. 1937(rec'd 7-6-38).—From April 12 to June 1, 1933, various spp. of bees visiting flowers in Ponary (near Wilno) were observed in connection with the time of blooming of various species of plants. 73 spp. of bees were noted: 38 spp. were eliminated, because their appearance was considered accidental. Tables are given indicating the time relationship of various species of visiting bees to the species of plants blooming during the period of investigation.—M. H. Haydak.

ANIMAL

1827. BASSINDALE, R. The intertidal fauna of the Mersey Estuary. Jour. Marine Biol. Assoc. United Kingdom 23(1): 83-98. 1 pl. 1938.—The Mersey Estuary consists of an upper basin and an open bay joined by a deep channel. Of the 37 square miles of intertidal banks half occurs in the upper basin and half in the bay. Four-fifths of the total area is of sand and the remaining fifth (most of which is situated in the upper basin) is of mud. The densely inhabited banks of the upper basin are mainly composed of mud, are situated high up in the shore zone and are

inhabited by large numbers of a few species notably Nereis diversicolor, Macoma balthica and Corophium volutator. The densely inhabited banks of the bay are of muddy sand, are situated in sheltered places near low water mark and are inhabited by a large variety of species.—R. Bassindale.

1828. DEGERBÖL, MAGNUS. A contribution to the investigation of the fauna of the Blosseville Coast, East Greenland, with special reference to zoogeography. (The Scoresby Sound Committee's 2nd East Greenland Expedition in 1932 to King Christian IX's Land.) Meddeleser om Grönland 104(19): 1-36. 1 pl., 1 fig. 1937.—Until 1932 this coast was practically uninvestigated from a zoological point of view. The country between Angmagssalik and Scoresby Sound contains several zoogeographical boundaries, in particular in the neighborhood of Wiedemann's fiord, lat. 68° 30' N.—Species belonging to several animal groups, viz. land mammals, butterflies and beetles (1 exception), have their boundaries of distribution on this coast. In the case of land mammals and butterflies these boundaries are southerly, in the case of beetles and the only known land snail Vitrina angelicae, northerly. Within the said area there is a transition from the continental, dry, high arctic Northeast Greenland climate to the oceanic subarctic, Southeast Angmagssalik climate. It seems that more mobile forms, such as land mammals and possibly butterflies, have immigrated into Greenland at a late post-glacial period from Arctic America. But forms occur, e.g., the wingless Otiorhynchus arcticus, which must be presumed to spread very slowly. The occurrence of these forms, which are of European origin, cannot possibly be explained except by supposing an earlier and then probably interglacial land-connection with Europe.—M. Degerböl.

1829. FYFE, R. V., and F. J. GAY. The humidity of the

atmosphere and the moisture conditions within mounds of Entermes exitiosus Hill. Australia Council Sci. and Indust. Res. Pamph. 82: 1-22. 9 fig. 1938.—Direct and indirect methods for measuring relative humidity within the mounds are descr. and the indirect method, that of measuring the moisture content of inner wall material, is elaborated. The inner wall material was found most constant in its physical composition and hence least variable as to moisture content and gave reliable information as to moisture relations obtaining within the mound. Results by both methods show a relative humidity in the inner mound of rarely less than 92% and usually 95%, i.e., the vapor pressure deficit probably does not exceed 2 mm. The high humidity is maintained despite a high diurnal and seasonal range in temp., and an external vapor pressure deficit which frequently exceeds 20 mm. In spite of the irregular loss of moisture from the surface of the mound and the independent, and also irregular, production of moisture by the metabolism of the termites, a constantly high humidity is maintained within the mound by reason of features in the structure and composition of the mound. In spite of changing temp, within the mound free water does not occur where the termites are regularly congregated and this is explained as due to the temp. maintained by the living termites and the special properties of the mound material. "The system balances the amount of water produced by metabolism by the amount lost by diffusion and evaporation and provides a buffer mechanism to compensate variations in the rate of production and loss."—S. F. Light.

1830. KENNEDY, CLARENCE HAMILTON. The present status of work on the ecology of aquatic insects as shown by the work on the Odonata. Ohio Jour. Sci. 38(6): 267-276. 1938.—A brief review of the literature on ecology of dragonflies covering: physiological spp., hybrid spp., population counts, reproductive ability, distribution limited by place of oviposition and by habits of larva, water temps, taxonomy of immature stages, food of dragonflies, predators on dragonflies, ecological distribution, ebb and flow of a population. Suggested methods of approach. Bibliography

of key literature.—C. H. Kennedy.

1831. MAYER, KAREL. Zur Kenntnis der Buchenhöhlenfauna. Arch. Hydrobiol. 33(3): 388-400. 5 fig. 1938.—Five cavities containing 100-5000 cc. of water were studied in a beechwood near Pressburg. From June to Aug. the temp. by day in the water was lower and more constant than the air temp. Fauna lists are given; Cyclops vernalis and

Simocephalus congener were certainly breeding in one hole; the dominant organisms are the larvae of the diptera Metriochemus martinii which overwinters as a larva and emerges in May, of Aedes geniculatus, and of the beetle Prionocyphon serricornis. A division of aquatic habitats in plants into Phytotelmata and Dendrotelmata is proposed. In the former, in leaf bases, the existence of the biotope is limited to a few months, the diurnal temp. changes are great, the most characteristic organism is the larva of Dasyhelea bilineata. In the latter the biotope may exist for some years. Diurnal variations in temp. do not exceed 4-8° C, the characteristic inhabitants in Central Europe are Prionocyphon serricornis, Metriocnemus martinii, Dasyhelea lignicola, D. sensualis, D. obscura, Myiatropa florea, Aedes geniculatus, Anopheles nigripes, Habrotrocha thienemanni. A complete list of species recorded from the Dendrotelmata, and from the Phytotelmata (in Angelica and Dipsacus) of Central Europe is given.—G. E. Hutchinson.

1832. NORRIS, K. R. A population study of the redlegged earth mite (Halotydeus destructor) in Western Australia, with notes on associated mites and Collembola. Australia Counc. Sci. and Indust. Res. Pamph. 84. 1-23. 10 fig. 1938.—Three generations of H. d. occur during a season at Guilford, Western Australia. The shape of the population graph varies considerably with the nature of the vegetation: The maximum population occurs in spring (Sept.-Oct.), when the survival rate is much higher than in earlier parts of the season (May-Aug.), owing to the fact that much more plant shelter is available. The population graphs for Smynthurus viridis may differ widely for different situations and also for the same situation in successive years. The numbers of Biscirus lapidarius are shown to have a probable relation to those of Smynthurus, accounting, at least in part, for a rapid decline in the numbers of springtails at the end of the season.—Auth. summ.

1833. PAVISIC. Über die Ökologie der Baumhöhlenmuckenlarven in Jugoslawien. Arch. Hydrobiol. 33(4): 700-705. 8 fig. 1938.—Felling of old trees may increase the number of breeding places by decay of the centre of the stump, followed by adventitious growth of small branches that protect the cavity from light and evaporation. 12 tree trunk holes are described, with drawings. Aedes ornatus is absent only where the water is richest in tannin; with it Ae. echinus is found. Anopheles nigripes is absent from the cleanest water, so that after a hole fills with water a succession may occur; first Ae. ornatus then An. nigripes. A relation between tannin content and seta length is noted in the latter species. Orthopodomyia albionensis is considered the only characteristic inhabitant of the permanently filled and colonized, better protected, holes.—G. E. Hutchinson.

1834. STANLEY, JOHN. The egg-producing capacity of populations of Tribolium confusum Duv. as affected by intensive cannibalistic egg-consumption. Canadian Jour. Res. Sect. D Zool. Sci. 16(10): 300-306. 1938.—Exps. are described in which adults of T. confusum are maintained at 27° C, and 75% relative humidity in 4 flour media: (a) ordinary whole wheat flour sifted through 76-mesh bolting cloth, (b) similar flour with 30-135 Tribolium eggs per g., (c) sifted whole wheat flour plus 3% of finely ground wheat germ and (d) flour + germ + eggs. When large numbers of eggs are eaten, there is a serious decline in egg production unless wheat germ in excess is also present. This is apparently due to a scarcity of certain accessory growth substances found in wheat germ but not to the same extent in eggs. When ground wheat germ is present, the beetles seem to do somewhat better in the presence of eggs, possibly because of a better water supply, obtained from the eggs.—Auth. abst.

PLANT

1835. ATKINS, W. R. G. The disappearance of Zostera marina. Jour. Marine Biol. Assoc. United Kingdom 23(1): 207-210. 1938.—The suggestion that the enfeeblement of Zostera marina due to lack of sunshine in 1931-2 is the fundamental cause of the epidemic is not supported by the meteorological data available from 1897 onwards, or by the known extinction coefficients of the water.—W. R. G. Atkins.

1836. BILLINGS, W. D., and W. B. DREW. Bark factors affecting the distribution of corticolous bryophytic communities. Amer. Midl. Nat. 20(2): 302-330. 8 fig. 1938.— Bryophytic communities were mapped on the butts of virgin forest trees in eastern Tennessee. Bark samples were also taken at specified heights on these trees and used to determine field moisture content, water-holding capacity, rate of drying-out, rate of absorption from a saturated atmosphere, and acidity of the bark. Communities of Neckera pennata, Anomodon attenuatus (and its facies of Anomodon rostratus), Campylium chrysophyllum, Brachythecium oxycladon, and Fissidens cristatus were confined to the barks of deciduous trees. Communities of Ulota crispa, Dicranum fulvum-Bazzania denudata, Hypnum reptile, Bazzania trilobata, and Mnium hornum were exclusive to the bark of Tsuga canadensis. The differences in distribution are ascribed to the differences in bark characteristics of deciduous trees and Tsuga, the bark of the latter being much more dry and more acid. Moisture content gradients, increasing from the upper part of the butt downward, were found to exist, resulting in a zonation and slow succession of bryophytic mats as the individual trees aged.-W. D. Billings.

1837. BLAKE, S. T. The plant communities in the neighbourhood of Coolum. Queensland Nat. 10(6): 106-113.

2 pl. 1938.

1838. GLOVER, P. E. The utility of aerial photographs as an aid to botanical survey. Jour. S. African Bot. 4(2): 35-44. 3 pl. 1938.—Phillips and several of his students, aided by aerial photographs, carried out investigations on the ecology of the flora in relation to the geology and other factors of the region, on a farm near Oberholzer on the West Rand; a region of broad undulating valleys between parallel ridges of E.-W. strike. The flora is divisible into 3 main ecological types:—(a) Grasslands of 3 types I. More or less undisturbed grassland on flatter, less stony country; II. Grassland on stony regions such as hill slopes; III. Grassland on the site of some recent or remote disturbance. (b) Protea (et al.)-Open woodland. (c) Acacia (et al.)-Scrub. Conclusions:—Aerial photographs aid Botanical Survey considerably when used as maps, giving a bird'seye view of the country under investigation. Old lands and other disturbed sites, difficult to discern on the ground, were easily recognizable on the photographs as dark lines showing plough furrows, by abrupt changes in color, or changes in tint. With experience scrub types can be recognized by the size and density of the dark spots shown on the photographs. Mixed and Undisturbed Veld can be recognized as even, homogeneously colored areas. Cloud shadows are occasionally a hindrance. The line of strike of a dyke, indiscernible on the ground, often shows clearly on the photographs. In this area, vegetation types did not adhere appreciably to different geological strata, though they tended to appear fairly consistently on the same aspects, especially *Protea* communities. This fact depends on factors such as protection from wind, local rainfall, fire, cold, soil moisture, and soil pH. With experience, certain vegetation types can be recognized on aerial photographs.-P. E. Glover.

1839. HOWELL, JOHN W. A fossil pollen study of Kokomo bog, Howard county, Indiana. Butler Univ. Bot. Stud. 4(9): 117-127. 1938.—The lower eleven feet of deposits show that a typical Canadian type of coniferous forest dominated by Abies and Picea was the pioneer after the soil was uncovered by the glaciers. Pinus is the only other genus represented in the lower 7 feet of deposits but Larix is present in the deposits 8 feet from the bottom. 12 feet from the bottom Abies and Picea lose dominance in favor of Quercus and Betula. 15 feet from the bottom Betula begins to lose out and Quercus retains undisputed dominance to the surface, never being approached by any other genus. Abies and Picea drop out entirely a few feet after their dominance is lost but Pinus remains in low frequencies to the first foot below the surface. Larix continues until within 12 feet of the surface and then disappears. Broad-leaved trees in addition to those above mentioned were Acer, with a maximum of 10% in 10-foot level; Carya, 25% maximum at the 7-foot level; Fagus, 5% maximum in the 2-, 4- and 11-foot levels; Juglans,

12% maximum at the 1-foot level; Populus, 13% maximum in the 2-foot level; Salix, 9% maximum in the 19-foot level; Tilia, 5% maximum in the 10-foot level; and Ulmus, 16% maximum in the 16-foot level. The following forest succession is shown: Abies-Picea, Abies-Picea-Larix, Quercus-Betula, Quercus-Carya, Quercus-Betula, Quercus-Juglans-Carya.—R. C. Friesner.

1840. HYDE, M. B. The effect of temperature and light intensity on the rate of apparent assimilation of Fucus serratus L. Jour. Ecol. 26(1): 118-143. 7 fig. 1938.—When light is not a limiting factor, the rate of apparent assimila-tion of submerged fronds of *F. serratus*, detd. as the amount of dissolved O₂ liberated (by Winkler's method), increases with rising temp, to a maximum value at 25-30°C after which the rate decreases. There is a maximum at 5°C, with a secondary max, at 25°, if the light is low (600 lumens). For any one temp., increase in light intensity from 600 to 15,840 lumens causes a progressive increase in the apparent assimilation rate, which, for any one light series, is greater at high temps. than at low ones. The capacity of F. serratus still to show a rising assimilation curve with increase of light intensity up to the equivalent

of 3 total daylight (16,000 lumens), causes it to be classed as a sun plant.—M. B. Hyde.

1841. MITCHELL, G. F. On a recent bog-flow in the County Wicklow. Sci. Proc. Roy. Dublin Soc. 22(4): 49-54. 1 pl. 1938.—An area of peat 6 feet deep and 100 by 60 yards on a slope at an elevation of over 2,000 feet flowed out over the peat below (probably in 1937) exposing patches of the underlying granite. The slope of the lower portion is 8°, that of the upper 11°, while above it is 14°. A pressure ridge of peat may have formed allowing the peat on the steeper portion to slide out on top of that on the gentler slope below. The vegetation of the flow and of the extensive peat area surrounding it contains Sphagnum, Eriophorum, Empetrum, Calluna, Scirpus caespitosus, and Vaccinium myrtillus, but the lower layers of peat are dry and the bog is firm underfoot. The stream originating in this peat was not abnormally swollen or changed with peaty material at the time of the slide. Other peat flows have occurred in the vicinity and such bursts may occupy a definite position in the cycle of development of bogs resting on sloping surfaces.—G. B. Rigg.

1842. NEUWOHNER, WERNER. Der tägliche Verlauf von Assimilation und Atmung bei einigen Halophyten. Planta 28(4): 644-679. 24 fig. 1938.—Gas exchange in Honckenya peploides, Salicornia herbacea and Cakile maritima was studied by the methods of Harder, Filzer and Lorenz and as used by Guttenberg and Buhr.—Halophytes do not differ from glykophytes in principle but the former are much less efficient than the latter. Perhaps their specific plasma structure which conditions their salt-resistance limits their productivity and speed of growth. Halophytes thus cannot stand the competition of glycophytes in glycic (sweet) soils.—B. R. Nebel.

1843. OTTO, JAMES H. Forest succession in the southern limits of Early Wisconsin glaciation as indicated by a pollen spectrum from Bacon's Swamp, Marion county, Indiana. Butler Univ. Bot. Stud. 4(8): 93-116. 1938.—This bog is within 25 miles of the southern border of Early Wisconsin glaciation. Results of pollen analysis of peat and marl showed forest succession from Abies-Picea dominance in early post-glacial time to Acer-Fagus-Quercus climax of the present. The former genera dominated the lower 12 feet of deposits but dropped suddenly at the 20-foot level in favor of broad-leaved genera dominated by Quercus. Pinus appears at the 29-foot level and persists to the top. A maximum of 23% appears at the 12-foot level. This is followed by a sudden reduction for the next 9 feet and a slight increase in the upper 3 feet. Abies disappears at the 11-foot level followed by Picea in the 10-foot level. The upper 10 levels mark the appearance of Acer and Fagus followed by an increase in frequency to a position of dominance. Forest succession suggests the following climatic periods: cool moist, moderate dry, warm with increased dryness, and warm moist.—R. C. Friesner.

1844. RICHARDS, RUTH REBEKAH. A pollen profile of Otterbein Bog, Warren County, Indiana. Butler Univ. Bot. Stud. 4(10): 128-140. 1938.—Otterbein bog is located

near the western border of Indiana in Warren County, at the very edge of Deam's Lake Region and Prairie areas. The depth of the bog was 44 feet. Indication of forest dominance was as follows: 44 to 35, foot-levels, Abies, Picea, Pinus; 34 to 33, Salix, Quercus, with Abies and Picea; 32 to 28, Quercus-Ulmus; 27, Quercus-Ulmus-Acer; 26 to 21, Quercus-Ulmus-Carya; 20 to 13, Quercus-Carya-Acer; 12 to top, Quercus-Carya-Ulmus, Abies and Picea disappeared abstractive at the 24 foot level and Salix showed. peared abruptly at the 34-foot-level and Salis showed a marked dominance at the 34-foot-level. Pinus persisted to the surface layer. Quercus was the most important genus from the 32-foot level to the surface.—J. E. Potzger.

OCEANOGRAPHY

(See also in this issue Entry 3303)

1845. COOPER, L. H. N. Salt error in determinations of phosphate in sea water. Jour. Marine Biol. Assoc. United Kingdom 23(1): 171-178. 1938.—The yellowing, which may occur during phosphate determinations in sea water by Denigès' ceruleomolybdimetric method, is attributed to hydrolytic products of complex molybdenyl halides. When 1 ml. of the standard acid molybdate reagent is used per 100 ml. of water, addition of Cu as recommended by Kalle reduces the development of color in sea water samples and distilled water standards to the same extent. The correction factor applying both to comparison by daylight in Hehner cylinders and to determinations in the Pulfrich photometer with the red S72 spectral filter is 1.12. However when 2 ml. of the reagent is used, the factor is dependent on the manner of making comparison. With daylight in Hehner cylinders it is 1.35; in the photometer with the red filter it is only 1.19.—L. H. N. Cooper.

1846. COOPER, L. H. N. Redefinition of the anomaly of the nitrate-phosphate ratio. Jour. Marine Biol. Assoc. United Kingdom 23(1): 179. 1938.—The anomaly is redefined as the amount by which the nitrate-phosphate ratio in the sea differs from 15, each salt being expressed as mg.atoms and phosphate being corrected for salt error by the appropriate factor (see preceding abstract).—L. H. N. Cooper.

Cooper.

1847. COOPER, L. H. N. Phosphate in the English Channel, 1933-8, with a comparison with earlier years, 1916 and 1923-32. Jour. Marine Biol. Assoc. United Kingdom 23(1): 181-195. 1938.—At Station E1, 22 sea miles south-west from Plymouth, the winter maximum for phosphate the state will be for plant growth in phate, representing the stock available for plant growth in the following spring, averaged 0.67 mg.-atom/m³. for the winters 1923-4 to 1928-9 and only 0.47 mg.-atom for 1930-1 to 1937-8. This fall in phosphate shows a close correlation with the abundance of summer spawning young fish and runs parallel with a decrease in the easting of the residual current at the Varne lightship in the Straits of Dover. Conditions of production in the individual years are discussed. The efficiency of utilization of the total stock of phosphate varies from year to year. In 1935 it was only 63%, in 1931, 93%. Between Feb. and May, the phosphate consumption averaged over 9 years was twice as great as it was in mid-Channel. High surface phosphate values are attributed to decomposition of floating organic material.— L. H. N. Cooper.

1848. GRAHAM, MICHAEL, and J. P. HARDING. Some observations on the hydrology and plankton of the North Sea and English Channel. Jour. Marine Biol. Assoc. United Kingdom 23(1): 201-206, 1 fig. 1938.—An hydrological section running from the northern North Sea through the southern North Sea and along the English Channel showed the same main features in the spring of 3 successive years, 1935-1937. High phosphate at the northern end is due to 1935-1937. High phosphate at the northern end is due to accumulation under a thermocline, at the southern end to oceanic influence. High phosphate off the estuary of the River Thames is probably due to sewage. The distribution of plankton (Copepoda, Chaetoceros, Coscinodiscus, Rhizosolenia, Phaeocystis) was characteristic, and similar in the 3 years.—M. Graham.

1849. HICKLING, C. F. The distribution of phosphates in the south-western area in April, 1938. Jour. Marine Biol. Assoc. United Kingdom 23(1): 197-200. 1 fig. 1938.—A survey of the distribution of the phosphates in the sea in the south-western area of England shows that the

surface water was poorer in phosphate than the deeper water, and that there were 3 regions where phosphate was exceptionally plentiful. This distribution was associated with the water movements on the one hand, and with the consumption of the phosphate by diatoms, on the other.—

C. F. Hickling.

1850. TATTERSALL, W. M. The seasonal occurrence of Mysids off Plymouth. Jour. Marine Biol. Assoc. United Kingdom 23(1): 43-56. 1 fig. 1938.—An analysis of the Mysids found in a series of bottom tow-nettings taken at 3 stations in the Plymouth area over a period of one year. Two marked maxima in the numbers of Mysids were observed: a summer maximum in July and Aug., composed entirely of *Leptomysis gracilis*, mainly breeding adults, and a winter maximum in Dec. and Jan., due mainly to immature specimens of Schistomysis ornata and Anchialina agilis, and also to 2 spp. of Gastrosaccus and Neomysis longicornis.—W. M. Tattersall.

LIMNOLOGY

(See also in this issue Entries 1831, 3284, 3396)

1851. DAILY, WILLIAM ALLEN. A quantitative study of the phytoplankton of Lake Michigan collected in the vicinity of Evanston, Illinois. Butler Univ. Bot. Stud. 4 (6): 65-83. 1938.—Total plankton showed maxima in June and Oct., both being due primarily to diatoms. These were accompanied by pulses of each of the dominant diatom genera. Different spp. of the same genus of phytoplankton were usually much unlike in numbers at the same time of the year. The classes in order of numerical abundance were: Bacillariophyceae, Chrysophyceae, Myxophyceae, Chlorophyceae, and Dinophyceae. The curve for Bacillariophyceae is essentially similar to that for total phyto-plankton; the curve for Chrysophyceae shows maxima in July and Nov.; that for Myxophyceae shows primary maximum in Sept. and secondary maximum in June. The remaining classes were never abundant. Factors appearing to affect periodicity were: turbidity, hours of sunlight, and temperature, though the last named did not seem to be of primary importance in diatom periodicity. Bacterial periodicity seems to be correlated with that of the algae and generally follows the latter with a lag.-R. C. Friesner.

Muschelkrebse des Ostalpengebietes. Arch. Hydrobiol. 33 (3): 401-502. 3 pl., 7 fig. 1938.—33 spp. are recorded; references being given to the systematic and ecological references being markets in the region. 13 spp. are accounts of all previous workers in the region. 13 spp. are high alpine, occurring over 1900 m.; the highest habitat for ostracods being the Jöri-see, alt. 2500 m., and containing Cypria ophthalmica, Candona candida, and Cyclocypris ovum. Temp. is believed to be the most important ecological factor in determining seasonal and altitudinal distribution within the region. All spp. are classified as cold stenotherm, frigophil, eueurytherm, thermophil and warm stenotherm. The most widespread high alpine spp. are the eneurytherm Cy. ophthalmica (19 high stations), the frigophil Candona candida (9 stations) and the eneurytherm Cyclocypris ovum (8 stations) and Heterocypris incongruens (6 stations); less abundant, but almost confined to the high alpine zone are the cold stenotherm Potamocypris zschokkei (6 stations in all, 5 over 1900 m.) and Eucypris juscata (5 stations in all, 4 over 1900 m.). 4 of 5 of the perennial eneurytherm spp. occur over 1900 m., none of the frigophil or cold stenotherm spp. are exclusively summer forms, even at high altitudes, no thermophil or warm stenotherm spp. are high alpine. 20 spp. are found in the littoral of lakes; of these Candona candida, C. neglecta (sometimes predominantly profundal), Cyclocypris laevis (rarely profundal), Cytherina lacustris (predominantly sublitoral) and Limnicythere sancti-patricii, extend to the profundal. Heterocypris incongruens, apparently a euryoxybiot form, is characteristic of temporary waters, though 24 spp. have been recorded from such habitats. Cypria ophthalmica is recorded from humic, and iron-rich waters and from sulphur springs; it is clearly highly eurytopic; other spp. from such habitats are listed. Certain preferences for various types of substrate are noted, deposits poor in organic matter are poorly colonized, but in general the

ostracods are eurydaphic and the nature of the vegetation in a locality has but little importance.—G. E. Hutchinson.

1853. KOLISKO, AGNES. Über die Nahrungsaufnahme bei Anapus testudo (Chromogaster testudo Lauterb.). Internat. Rev. Ges. Hydrobiol. u. Hydrogr. 37(4/5): 296-305. 10 fig. 1938.—The food of A. testudo consists chiefly of peridinians and its mouth parts are adapted for feeding on them. The various structures involved in the feeding process are descr.; of special interest is a knife-like projection which aids in holding the peridinian. Anapus pierces the wall of the peridinian and sucks out the cell contents. There was a definite correlation between the abundance of A. testudo and that of Ceratium hirundinella, on which it was feeding, in Lower Lunz Lake during the time of this investigation.—C. Inday

and that of Ceratium narunamenta, on which it was feeding, in Lower Lunz Lake during the time of this investigation.—C. Juday.

1854. RUTTNER, F., und F. SAUBERER. Durchsichtigkeit des Wassers und Planktonschichtung. Einige Beobachtungen in den Lunzer Seen. Internat. Rev. ges. Hydrobiol. u. Hydrogr. 37(4/5): 405-419. 4 fig. 1938.—Measurements were made at a series of depths down to 28 m. using Pettersson's transparency meter. These showed that at certain seasons the lake-water was of very variable transparency. Thus it might show sharp minima in transparency at 6 and 12 m. in July, or in Dec. might remain constant down to 10 m. and then fall sharply to 14 m., near bottom. The curves so obtained show a close correspondence, in the inverse sense—like mirror images—with those obtained by plotting the total number of organisms, in thousands per cc., against the depth. The effect, with a light path of 1 m., is not very noticeable with a population density of a few hundreds per cc. With several thousands the effect is easily recognisable, and is very striking with several ten thousands per cc. It is hoped that it may be possible to differentiate the effects due to various organisms and mineral matter by determining the absorption in different parts of the spectrum by means of color filters.—W. R. G. Atkins.

1855. SEGERSTRÂLE, SVEN G. Studien über die Bodentierwelt in südfinnländischen Küstengewässern. IV. Bestandesschwankungen beim Amphipoden Corophium volutator. Acta Soc. Fauna et Flora Fennica 60: 245-255. 1 fig. 1937(rec'd 7-14-38).—In the bottom material of Krogarviken Bay, C. v. varied from 4 to 5429 individuals per sq. m., during 1928-1931. Especially interesting was the enormous reduction in numbers found from May 1929 to June 1930, due probably to a disease, the presence of which was indicated by brown patches on different parts of the

body.—T. v. Brand.

1856. WELCH, PAUL S. A limnological study of a bog lake which has never developed a marginal mat. Trans. Amer. Microsc. Soc. 57(4): 344-357. 1 fig. 1938.—The major physicochemical conditions at Munro Luke, Michigan, extending over 10 summers, are descr. About 120 net plankters are listed. The list shows: (1) many genera compared with the number of species; (2) more phytoplankters than zooplankters; (3) limited number of diatoms and copepods; and (4) numerical prominence of the Chroococcaceae, Desmidiaceae, Protozoa, Rotifera and Cladocera. Quantitative net-plankton studies during the summer season show: preponderance of the phytoplankton; large quantities of Microcystis; more Protozoa and Rotifera than other groups of zooplankton; small quantity of diatoms; restricted quantities of Cladocera and Copepoda in the zooplankton; and restricted nature of the whole plankton. The bottom fauna is now much reduced. Sphaeridae and Corethra are the numerically dominant groups. 18 spp. of fish are recorded from the lake. Biological productivity is much reduced. The lake is now in a senescent stage. Bottom encroachment is the sole cause of basin reduction; marginal encroachment is absent. Sediments are almost wholly autochthonous.—P. S. Welch.

WILDLIFE MANAGEMENT-AQUATIC

(See also the section "Pisces"; and Entries 1815, 2711, 3310)

1857. ANDERSSON, K. A. A study of the rate of growth of some fishes in the Baltic. Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions 108(1): 67-72. Map. 1938.—That the rate of growth of animals is slow when they live in limited areas of the sea holds true

in general for the inner parts of the Baltic. But for the cod and herring, the rate of growth is faster in the Botten Sea (inner Baltic) than in the middle Baltic. This is explained by more favorable environmental conditions.—

1858. ANDERSSON, K. A. An investigation into the alterations in the growth-rate of the haddock. Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions 108(1): 85-87. 1938.—O-group haddock in the Skagerak in 1929 ranged in size from 16-19 cm., in 1938 from 20-23 cm. The 1929 O-group was about 37 times more abundant than the 1938 O-group. The difference in growth rate is attributed to differential competition between individuals.— F. N. Clark.

1859. BÜCKMANN, A. Über das Wachstum der Nutzfische im Gebiet der südlichen Nordsee. Cons. Perm. Internat. Explor. Mer Rapp. et Procès-Verbaux Réunions
108(1): 73-84. 1938.—The analysis of growth of net-caught
fish in the southern North Sea presents many complications.
This growth rate as indicated by various workers is reviewed
for Clupea harengus, C. sprattus, Gadus morrhua, Pleuronectes platessa, P. limanda, and Solea vulgaris.—F. N.
Clark.

1860. FAGE, L., et A. VEILLET. Sur quelques problèmes biologiques liés a l'étude de la croissance des poissons. Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réumions 108(1): 45-48. 1938.—Studies on various species of fish indicate that the rate of growth and the relation of the growth of different parts of the body to the total length vary with age, sex and geographic location of the individuals. Thus, both internal and external factors are involved in the determination of growth rates.—F. N. Clark.

determination of growth rates.—F. N. Clark.

1861. HJORT, JOHAN. Studies of growth in the northeastern area. Cons. Perm. Internat. Explor. Mer Rapp. et Procès-Verbaux Réunions 108(1): 1-8. 1938.—The herring of the northern North Sea furnish an example of a fish population whose variations in growth can be associated with environmental changes and are not influenced by the depredations of man; the cod comprises a fish population whose growth in more recent years has been altered by extensive fishing.—F. N. Clark.

1862. HöGLUND, HANS. Über die horizontale und vertikale Verteilung der Eier und Larven des Sprotts (Clupea sprattus L.) im Skagerak-Kattegatgebiet. Svenska Hydrogr.-Biol. Komm. Skrift. 2(3): 1-40. 7 maps, 2 fig. 1938.—The investigation is based on collections made during 1931-1934. The chief spawning area was found along the western coast of Sweden from near the Norwegian border to the vicinity of Anholt. It followed approx, the 50 and 100 m. depth curves. An independent spawning location was found in the Uddevallafjords (Isle of Orust). The fish spawn in the uppermost water layers. The vertical distribution of the developmental stages of the eggs was irregular at the different stations, indicating that, at least in this region, no change in the specific gravity of the eggs occurs. The sp. gr. varies greatly from station to station. An accumulation of larvae was observed during day time in the upper water layers.—T. v. Brand.

1863. JANSSEN, JOHN F. Jr. Second report of sarding that the contraction of larvae was observed during day time in the upper water layers.—T. v. Brand.

1863. JANSSEN, JOHN F. Jr. Second report of sardine tagging in California. California Fish and Game 24(4): 376-390. 4 fig. 1938.—From March, 1936 to June, 1938, 352 sardines were tagged on the coast of California. The tag used is a nickel-plated steel strip placed inside the body cavity of the fish. It is recovered by means of electro-magnets in meal lines of sardine reduction plants. Up to July, 1938, these tags have yielded 1334 recoveries. Most returns have been from fish caught soon after tagging in the same fishing region as tagged: however, 258 tags from southern California fish have been recovered in central California, and 30 in Oregon, Washington and British Columbia; 10 British Columbia tags and 1 Oregon tag have been taken in California and 8 central California tags were recovered in southern California. These recoveries indicate a summer northward movement and a southward movement during the late fall and winter. Recoveries show that the larger fish make longer migrations. An as yet unknown proportion of the tags are not recovered due to shedding of tags, death of fish as a result of tagging and inefficiencies in the methods of recovery.—J. F. Janssen, Jr.

1864. JENSEN, AAGE J. C. The growth of the plaice in the transition area. Cons. Perm. Internat. Explor. Mer. Rapp. et Process-Verbaux Réunions 108(1): 103-107. 1 fig. 1938.—The length of age-groups within the stock is dependent partly on growth and partly on the fishery. As the fastest growing fish of an age-group reach the size limit, they are caught off by an intense fishery and the size of the remainder thereby reduced. This amounts to 2 cm. for the II-group in the Belt Sea and 1 cm. in the northern Kattegat. Local differences in growth result from varying densities of the stock and available food supply. Temperature and salinity also play a rôle in growth rate. Intense ishing thins the stock and produces an increase in growth rate by eliminating competition for food.—F. N. Clark.

1865. JENSEN, AAGE J. C. Factors determining the apparent and the real growth. Cons. Perm. Internat. Explor. Mer. Rapp. et Process-Verbaux Réunions 108(1): 109-114.

1865. JENSEN, AAGE J. C. Factors determining the apparent and the real growth. Cons. Perm. Internat. Explor. Mer. Rapp. et Procèss-Verbaux Réunions 108(1): 109-114. 1938.—Determination of growth by marking experiments leads to error if the recaptures tend to be selected from either the faster or slower growing fish. Growth rate determined from measurements of otoliths is in error when the growth rate of the otolith and the fish is not constant. Selectivity of gear may make inaccurate growth measurement from age analysis. Temp. and food influence growth ate. For the plaice the temp. limits of growth are about 10-15°C.—F. N. Clark.

1866. LEA, EINAR. A modification of the formula for alculation of the growth of herring. Cons. Perm. Internat. Exploid Mer Rapp. et Procès-Verbaux Réunions 103(1): 13-22. 2 fig. 1938.—Data given show that a straight line relationship exists between the growth of the fish and of the scale. From the basic equation for a straight line, an equation is developed which if based on adequate material should yield a growth formula for herring in which the effect of heteromorphic growth in fish length and scale

1867. MOLANDER, ARVID R. Investigations into the growth-rates of the common dab and the flounder in the southern Baltic. Cons. Perm. Internat. Explor. Mer. Rapp. et Proces-Verbaux Réunions 108(1): 89-101. 1938.—From 1919 to 1937 the growth rate of both the dab and flounder has increased and the older year-classes disappeared from the population. This change is ascribed to intensity of fishing, for as the catch per trawling hour decreases the growth rate increases. The proportion of 33 has also diminished, possibly because the 33 now reach their maximum size more quickly and hence have a shorter life span.—F. N. Clark.

1868. NEILL, R. M. The food and feeding of the brown trout (Salmo trutta L.) in relation to the organic environment. Trans. Roy. Soc. Edinburgh 59(2): 481-520. Map, I fig. 1938.—Quantitative data are given of stomach contents of trout obtained at regular intervals through the main feeding period of the year from a limited area of river (mean current velocity 4.07 ± 0.5 ft. per sec.). These are viewed alongside similar data of the fauna of the same area, over the same period. The seasonal changes in both food and fauna are discussed. The correspondence of the 2 sets of data summarised by Spearman's rank coefficient of correlation is R = +0.397 with P.E. = 0.11. The accessibility to the fish of various potential food fauna present is discussed. The significance of accessibility as a limiting factor in the diet of wild fauna is brought out by the use of an arbitrarily assessed coefficient of accessibility, based on the bionomics of the groups concerned, which applied to the numerical data of the adjacent fauna previously given raises the correspondence with the trout's stomach contents to a tugh figure e.g., R = +0.75 or +0.90. The trout's diet covers the whole range of animals present in whatever type of habitat it occurs to an extent dependent on their degree of accessibility and the extent of their representation in the fauna. This accounts for the stomach contents without invoking discrimination by the fish. For trout specific food lists are invalid, and food (except as regards quantity) is but a limiting factor in distribution.—R. M.

1869. OTTESTAD, PER. On the relation between the growth of the fish and the growth of the scales. Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réwords 108(1): 23-31. 1938.—From the vast literature on the

subject, representative papers which deal with varied methods are discussed. This discussion indicates that the study of the nature of the relationship between the size of the scale and the corresponding average fish length cannot furnish proof or disproof of the constant ratio of fish length to scale length of individual fish, nor can it reveal the relationship between the growth of the fish and its scales. There are, however, so many indirect proofs that the fish and the scales grow proportionally, that this may be accepted as a fact. This does not mean that the relationship is a straight line in mathematical terms but that the ratio is approximately constant throughout life.—F. N. Clark.

1870. POULSEN, ERIK M. On the growth of the cod within the transition area. Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions 108(1): 49-51. 1938.—Spawning begins in the northern part of the area about Feb. and shifts gradually to about June in the region of the Baltic. The growth rate is more rapid to the north and lessens to the south. This is caused in part by earlier spawning and later age at first maturity in the more northern populations. The slower growth rate to the south must, however, involve other factors which are not understood at present.—F. N. Clark.

1871. POULSEN, ERIK M. On the growth of the Baltic plaice. Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions 108(1): 53-56. 1938.—Intensive fishing has thinned out the Baltic stock of plaice and resulted in an increased growth rate. Thus external and not internal factors appear to be the chief determinants of growth

rate within the range of growth for the species. F. N.

Clark.

1872. ROLLEFSEN, GUNNAR. Changes in mean age and growth-rate of the year-classes in the Arcto-Norwegian stock of cod. Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions 108(1): 37-44. 1938.—The proportion of older year-classes in the adult population of cod in the Lofot fishery has decreased remarkably. This may have been caused by increased mortality among the adult fish, by accelerated sexual maturation in the immature stock, by increased mortality among the immature fish. Norwegian fishing has not increased in intensity but the trawl fisheries of England and Germany have taken an increased toll from the adult cod. The English and Russians have similarly increased the strain on the immature fish. There is also evidence of an acceleration in maturation in the immature stock.—F. N. Clark.

1873. ROUNSEFELL, GEORGE A., and GEORGE B. KELEZ. The salmon and salmon fisheries of Swiftsure Bank, Puget Sound, and the Fraser River. Bull. U. S. Bur. Fish. 49(27): 693-823. 4 pl., 3 fig. 1938.—The sockeye salmon, Oncorhynchus nerka, spawns chiefly in the tributaries of lakes in the Fraser River system. The young live about 1½ years in these lakes before descending to the sea. They mature chiefly at 4 years of age and weigh about 6 pounds. An analysis of seasonal occurrence from gill-net catches indicates that the heavy, early-season run of superior quality sockeyes has suffered the greatest decrease in abundance. Indices of abundance from gill-net and trap catches both show a tremendous decline in all cycles. The coho salmon, O. kisutch, is the most widely distributed species of salmon found in the region. 98% mature at 3 years of age, and weigh about 7-8 pounds, and the migration to the spawning beds occurs during the fall months, tion to the spawning beds occurs during the fall months, at which period the greater part of the catch is made. Indices of abundance from both trap and purse seine catches show a high level of abundance in early years and a present level that is lower than at any previous time in the history of the fishery. The king salmon, O. tschawytscha, spawn chiefly in the upper portions of the larger streams. The young usually dwell some time in fresh water before descending to the sea. They mature chiefly at a and 4 years of age and weigh about 22 pounds. They are caught from early spring to fall, the bulk of the catches being made during early summer. Indices of abundance from trap catches do not show any definite trends in the northern areas, but do indicate a decrease in the runs of recent years in the southern part of Puget Sound. The pink salmon, O. gorbuscha, spawn in the lower reaches of the streams. Upon hatching the young descend im-

mediately to the sea. The adults invariably mature at mediately to the sea. The addits invariably mature at 2 years of age and weigh about 4 lbs., and in the greater part of this region they appear in abundance during the odd-numbered years, whereas only a few thousand are taken in the even-numbered years. Indices of abundance from purse seines and traps indicate that, following the obstruction at Hell's Gate in 1913, which prevented them from reaching their spawning grounds in the upper Fraser River, the pinks declined to about \$\frac{1}{2}\$ of their former abundance. The chum salmon, \$O\$, keta, spawn in the lower portions of the streams and the young go directly to the sea. An index of abundance from Admiralty Inlet traps shows abundance in recent years to be less than helf that of the period previous to the way. The extense half that of the period previous to the war. The average size of delivery by purse seines also indicates a higher level of abundance previous to 1915.-Auth. summ.

1874. RUUD, J. T. On the Norwegian research work concerning Pandalus borealis. Cons. Perm. Internat. Explor. Mer Rapp. et Proces-Verbaux Reunions 107(3): 67-68.
1938.—The report is a summary and discussion of data published as Hvalradets Skrifter Nr. 17. The destruction of young prawn and the limits of trawl net mesh size are

reviewed.—J. L. Wilding.

1875. STORROW, B., and DOROTHY COWAN. Herring investigations. Rept. Dove Marine Lab. Ser. III. 5. 10-19. 1938.—Herring investigations of previous years have been continued. The age and growth rate of 1444 herring taken in commercial catches at Yarmouth and Buncrana were detd. Young fish with 2 winter rings were not so abundant as in 1935, forming 15% of the sample, 61% were 3 year olds and 18% 4 year olds and the remainder 5 or over. Fish with 3 and 6 winter rings formed the bulk of the 1936 sample and averaged 24.1 and 26.6 cm. res. The winter sample and averaged 23.1 and 20.0 cm. 163. The winds fishery of the north of Scotland was a failure and no fish were obtained. The growth rates of early maturing fish from the north-west coast are compared with those of an estuarine school. The estuarine fish made a more rapid growth during their 3d year. The majority of the Buncrana

sample were 6 and 9 years old, and 25% of the fish were less than 4 years old.—J. L. Wilding.

1876. SUND, OSCAR. On diversity of growth in fish. Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions 108(1): 33-36. 1938.—The standard deviations of the yearly increments in length, measured from scales, furnish a clue to the history of fish in a sample. A large value for the standard deviation indicates a diversified history for the sample and a small value suggests that the population from which the sample came had a long common history. Cod measurements indicate that the populations have been formed by a gradual accumulation; haddock, an early diversified history with later accumulation; saithe, a common history throughout the life of the population.—F. N. Clark.

WILDLIFE MANAGEMENT-TERRESTRIAL

1877. CHAPPELLIER, A. Le piège—chronomètre. Ann. Epiphyties et Phytogénétique 4(2): 333-336. 4 fig. 1938.—An apparatus is described for registering the times at which small rodents are snared.—W. V. L.

1878. GLADING, BEN. Studies on the nesting cycle

of the California valley quail in 1937. California Fish and Game 24(4): 318-340. 11 fig. 1938.—Studies on the California valley quail (Lophortyx californica vallicola) are in progress at the San Joaquin Exptl. Range in the Sierra Nevada foothills of Madera County, California. 96 nests were found in 1937 from Apr. 22 to Luly 26 the legress were found in 1937 from Apr. 22 to July 26, the largest number in May. 11 cover types were utilized for nesting; dry grass or weeds with no other protection and dry grass or weeds growing through fallen dead brush and rock outcrops being used most commonly. Incubated nests averaged 1007 company dutch and grasses. averaged 10.97 eggs per clutch and successful nests averaged 10.18 young per brood. Only 17 of the 96 nests were successful. 18 were abandoned either before or after eggs had been deposited. Ground squirrels (Citellus b. beecheyi) were inferred to have taken large numbers of eggs; 30 nests were charged to ground squirrel depredations. An increase in quail of 154% over a period of 2 years followed ground squirrel control on a 300-acre plot; no such change occurred during the same period on an adjacent non-controlled area.

Coyotes, bobcats, feral house cats, skunks, gray foxes and California jays each destroyed small numbers of nests. A few were destroyed accidentally by livestock. Manipulation of nesting environment may be an important game management tool for this species.—B. Glading.

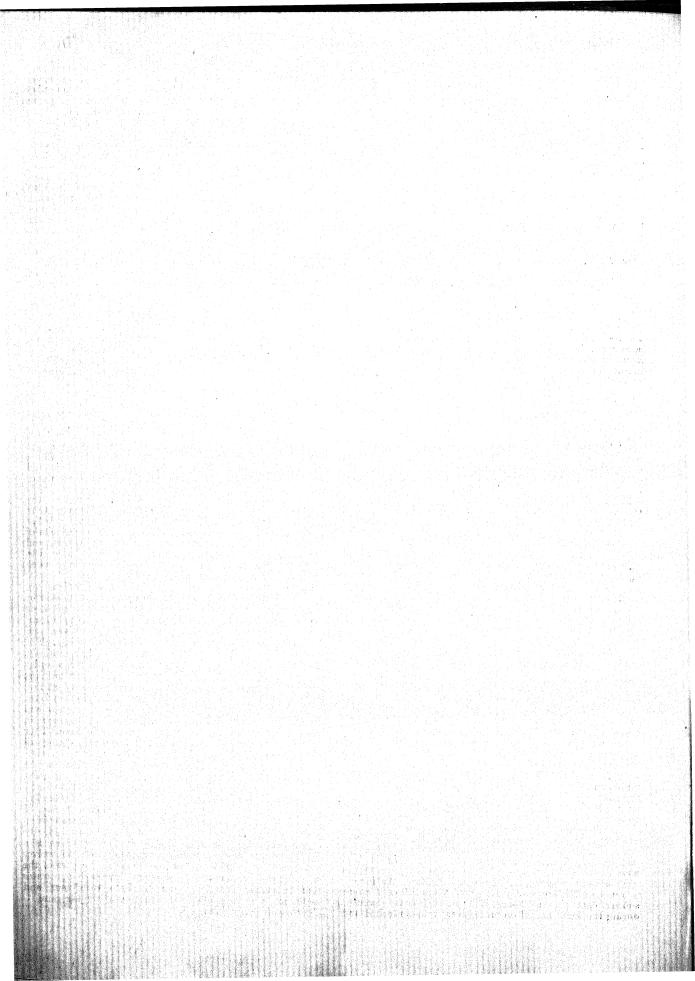
1879. GREEN, WILLIAM EDWARD. The food and cover relationship in the winter survival of the Ring-necked Pheasant, Phasianus colchicus torquatus Gmelin, in northern Iowa. Iowa State Coll. Jour. Sci. 12(3): 285-314. 8 pl. 1938.—Studies carried on during the most severe winter ever recorded for Iowa (1935-'36) showed a high mortality of the Ring-necked Pheasant. There seemed to be an abundance of both food and cover, but the two were not present in the proper relationship. Mortality was not present in the proper relationship. Mortality was largely due to climatic factors. Predation and poaching losses were negligible, as were losses from pneumonia. There was a total loss of 48.2% of the population during the winter. Freezing and choking, responsible for a loss of 27.2% of the population, were the most lethal factors. Mortality increased in a direct proportion to the distance of food from cover. Losses were at a minimum in areas where there was good cover adjacent to an available food supply; in areas where the flocks were compelled to range from cover in order to feed, the losses increased as the distance

cover in order to feed, the losses increased as the distance necessary to range in feeding increased.—W. E. Green.

1880. LAY, DANIEL W. How valuable are woodland clearings to birdlife? Wilson Bull. 50(4): 254-256. 1938.—30-min. time-unit bird counts in Walker County, Texas, pine-oak-hickory woodland revealed that the margins of clearings contain 41% more species and 95% more individual birds than the corresponding woodland interiors.—D. W. Law.

D. W. Lay.

1882. OLSON, SIGURD F. A study in predatory relationship with particular reference to the wolf. Sci. Month. 46(4): 323-336. 3 map, 6 fig. 1938.—Predators have been eliminated without regard for the influence they might have upon the balance of life in the communities of which they are a part. Game refuges have often been administered as herbivore sanctuaries so that primitive conditions under which hoofed game retains its natural alertness are now mostly lacking. Probably more wolves remain in the Superior National Forest in northeastern Minnesota than in any other part of the U.S. Despite popular belief that wolves live upon deer, the food in summer includes grouse, mice, voles, marmots, fishes, snakes, insects, and some vegetation. In fact almost anything that crawls, swims, or flies may be included in the diet. In winter when most of the small mammals are in hibernation and other items of the summer food unavailable, the wolves are forced to feed almost entirely upon deer and snowshoe hares. When food is scarce, 3-4 meals a month will keep a wolf from starving.—Conditions of the Superior National Forest environment, hunting habits of the wolves, and organization and range of the packs are described. The author contends against the belief that wolves kill wantonly. He interprets apparently excess killing when opportunity affords as an instinctive first step in a process of building up a reserve food supply. Carcasses not consumed at first under natural conditions would be revisited and eaten later. The author believes that the poisoning of carcasses and setting traps around them has instilled fear to such an extent that wolves are reluctant to approach them. Thus control campaigns prevent the animals from eating all of their kills and compel them to kill more than they would if unmolested. There are about 250 wolves on the area discussed and they kill about 1,500 deer annually. The deer population is in the neighborhood of 20,000 animals, a herd that can stand yearly loss of about 4,000 without diminution of the breeding stock. The presence of wolves in a wilderness area instead of being a hazard is an asset to big game. The majority of the kills are old, diseased, or crippled animals, the elimination of which is a benefit to the stock and the depredations of the wolves conduce to a desirable state of alertness on the part of the deer. Experience on the Superior Natl. Forest demonstrates that sanctuary can be given to both carnivores and herbivores without danger of decimation of the big game.-Courtesy Wildlife Rev.



PALEOBOTANY

EDWARD W. BERRY, Editor

(See also B. A. 13(1): Entries 1538; and in this issue 1824, 2899, 2905, 3233, 3235)

2781. AXELROD, DANIEL I. The stratigraphic significance of a southern element in later Tertiary floras of western America. Jour. Washington Acad. Sci. 28(7): 313-322. 1938.—A study of the Miocene floras in the western U. S., especially the Middle Miocene Tehachapi flora from the western border of the Mohave Desert, shows that there is an element in the Pliocene floras which had an origin in the southwestern U. S. and northern Mexico. These plants migrated northward along drier upland habitats during the Miocene and entered lowland deposits to the north in great abundance in early Pliocene time, when lowland conditions became drier and warmer. They disappeared from areas of their former distribution in the north by the later Pliocene, in response to the lowered temps, and increased rainfall which preceded the Pleistocene. Present evidence suggests that the occurrence of this southern element in a northern Pliocene flora establishes its early Pliocene age.—D. I. Axelrod.

2782. BACKMAN, A. L., och ASTRID CLEVE-EULER. Om Litorinagränsen i Haapavesi och diatomacéfloran på Suomenselkä. (Uber die Litorinagrenze in Haapavesi und die fossile diatomeenflora auf dem Suomenselkä.) [With Ger. summ.] Acta Soc. Fauna et Flora Fennica 60: 209-245. 1937(rec'd 7-14-38).—This work is a supplement to work by these authors in 1922. The fossil diatom flora was detd., an effort being made to determine accurately the highest boundary of the Litorina sea at Haapavesi and in the neighboring parts of Kärsämäki in Österbotten. The older developmental phases of the northern Ostsee were further studied through a study of the diatoms in a series of samples at Suomenselkä. The material was collected by Backman and the diatoms were detd. by Cleve-Euler.—R. Patrick.

2783. KIRCHHEIMER, FRANZ. Beiträge zur näheren Kenntnis von Vitaceen-Samenformen tertiären Alters. Planta 28(4): 582-598. 18 fig. 1938.—Fossil remains may be classified into 2 groups. A. Dorsal side more or less smooth, ventral side without nodosities. B. Dorsal side more or less smooth, with rayed furrows, ventral side with nodosities. A is called teutonica, B, ludwigii type. As a type specimen of A, seeds from the upper miocene soft coal of Salzhausen in the Vogelsberg may serve. The group comprises 15 seed shapes of the tertiary of Europe, East Asia, North and

South America and the arctic. The lower Eocene and the end of the uppermost Tertiary furnished some forms. These are described. As a type specimen of the *ludwigii* group Vitis ludwigii or Vitis braunii Ludwig may serve. The group comprises 15 seed shapes from the tertiary of Europe, East Asia, N. and S. America. Seeds of today belong to the teutonica type excepting the Muscadinia species, Vitis munsoniana and Vitis rotundifolia, which must be referred to the ludwigii type. Also some Ampelocissus and Tetrastigma spp. have ridged seeds. Various Vitoideae existed even in Tertiary Europe.—B. R. Nebel.

2784. MERRIAM, C. W., and L. H. DAUGHERTY. Proto-

2784. MERRIAM, C. W., and L. H. DAUGHERTY. Protophycean algae in the Ordovician of Nevada. *Journ. Washington Acad. Sci.* 28(7): 322-326. 1 fig. 1938.

2785. READ, CHARLES B. Some Psilophytales from the Hamilton group in western New York. Bull. Torrey Bot. Club 65(9): 599-606. 1 pl. 1938.—Schizopodium mummii and Arachnoxylon kopfi (Arnold) are descr. from the upper middle Devonian (Tully pyrites) of western New York. S. mummii is close to the genotype, S. davidi from Devonian strata in Queensland, Australia. This is the 2d reported occurrence. A. kopfi is more robust than any of the known spp. of Asteroxylon, and has mesarch protoxylem and prominent loops of parenchyma near the apices of the arms of xylem. The early zygopteridean stem types may have been derived from such a form.—C. B. Read.

2786. READ, CHARLES B. The age of the Carboniferous strata of the Paracas Peninsula, Peru. Jour. Washington Acad. Sci. 28(9): 396-404. 6 fig. 1938.—The Carboniferous flora which has been known for sometime from the Paracas Peninsula, Peru is discussed in the light of a new collection. Determinable forms are Sphenopteris parasica Gothan; Adiantites whitei (Eremopteris w. Berry); Adiantites peruianus (E. p. Berry); Adiantites bassleri; Rhacopteris ovata (McCoy) Walkom; Rhacopteris sp. c/f R. cuneata Walkom; Aphlebia australis; Lepidodendron peruvianum Gothan; Lepidophyllum sp. Gothan; and Calamites peruvianus Gothan. Older collections have been regarded by some investigators as indicative upper Carboniferous age and by other as suggestive lower Carboniferous age. The present collection contains forms which point to a lower Carboniferous age.—C. B. Read.

ALGAE

(See also in this issue Entries 1820, 1840, 2784, 3044, 3048, 3098, 3233)

2787. AGHARKAR, S. P., and B. KUNDU. Charophyta of Bengal. Calcutta Univ. Jour. Dept. Sci. 1(1): 1-23. 9 pl.

2788. DANGEARD, P. Sur la présence du Cystoseira mediterranea Sauvageau et de quelques autres espèces sur la Côte atlantique marocaine. Bull. Soc. Bot. France 85 (5/6): 305-307. 1938.—The recent discovery on the Atlantic coast of Morocco of 3 species of Cystoseira represents a considerable extension to their previously known ranges and modifies earlier ideas concerning the evolution of these spp.—E. L. Core.

2789. EL-NAYAL, A. A. On some new freshwater algae from Egypt. Egyptian Univ. Bull. Fac. Sci. 13: 1-15. 1 pl., 7 fig. 1937 (rec'd 3-23-38).—Forms of Chlorogonium, Volvox, Characium, Stigeoclonium, Cosmarium, Fischerella, and Aulosira described as "new species," without Latin descriptions and the designation of type specimens.—F. Drouet.

2790. HYDE, M. B. Observations on Fucus serratus L. kept under laboratory conditions. Jour. Ecol. 26(2): 316-327. 3 fig. 1938.—Although a frond of F. serratus, which was kept under observation for 12 months, decayed away at the edges, the value of assimilation per unit area remained unimpaired, when measured under comparable conditions of light and temp., decreasing during the cold, dull winter months, but increasing during the following summer

to a value as great as during the previous July. The frond increased in length and regeneration of new vegetative tips occurred from the young ends. Development of $\mathfrak P$ conceptacles with oogonia took place, the oospheres being liberated about 5 months after signs of conceptacles were first observed. In another frond, which was never at a temp. above 15°C, there was no sign of decay after over 8 months in the laboratory, and an increase in area of 100% was brought about by growth. Thus a great power of tenacity of life was seen. Temp. seems to be an important factor in keeping F. serratus in the diffuse light of a laboratory.—M. B. Hyde.

2791. KRIEGER, W. Süsswasseralgen aus Spitzbergen. Ber. Deutsch. Bot. Ges. 56(2): 55-72. 1938.—This list of fresh water algae from the coast of NW Spitzbergen includes: Desmidiaceae 56 spp. or vars., Zygnematales 2, Volvocales 1, Tetrasporales 2, Protococcales 6, Ulotrichales 7. These are divided into 6 geographic-ecological groups: arctic spp., arctic-alpine spp., moss-forms, cosmopolitan spp., brackish-water forms, and snow algae. The following European genera are rare: Closterium, Pleurotaenium, Netrium, Micrasterias, Scenedesmus, Pediastrum. 60 references on arctic fresh water algae are listed.—H. C. Beeskow.

2792. LACKEY, JAMES B. Scioto River Valley forms

SPERMATOPHYTA

2821. TURRILL, W. B. The expansion of taxonomy with special reference to Spermatophyta. Biol. Rev. Cambridge Philos. Soc. 13(4): 342-373. 1938.

GYMNOSPERMAE

2823. FLOUS, (Mile.) F. Révision du genre Pseudotsuga. Bull. Soc. Hist. Nat. Toulouse 71(1/2): 33-164. Illus. 1937 (rec'd 5-19-38).—In 2 keys, one based on morphological features, the other on anatomical characters of the leaves, the author recognized and distinguished 18 spp. rather than the much smaller and variable numbers noted by others. Each species is illustrated and described in detail,

morphologically as well as anatomically.—E. H. Fulling.

2824. HADDOCK, PHILIP G. Picea breweriana in Shasta
County. Madroño 4(6): 176. 1938.—New locality record
in California for this species.—E. Crum.

2825. MIROV, N. T. Phylogenetic relations of Pinus jeffreyi and Pinus ponderosa. Madroño 4(6): 169-171. 1938.

—Distributional evidence and previous studies of oleoresin of Pinus ponderosa and P. jeffreyi indicated that the former species is phylogenetically younger than the latter. An additional support of this point of view was obtained when iodine numbers of the seed oil of the 2 pines were compared with the general trend of changes in iodine numbers in conifers. P. ponderosa with its iodine value higher than

that of P. jeffreyi may be considered as a relatively younger species.—N. T. Mirov.

2826. PLAVŠIĆ, SVETISLAV. Phylogenetische Untersuchungen über die Gattung Picea auf Grund der Blattanatomie. Planta 28(3): 453-463. 2 fig. 1938.—Studies of the distribution of stomata and the variation in form of the foliage leaves of some species of *Picea* from the sections *Eupicea* and *Omorica* are described. Illustrations of transectional anatomy and statistics concerning the distribution and size of the stomata are presented for *Picea excelsa*, *P. omorica*, *P. ajanensis* and *P. sitchensis*. Evidence is presented that the spp. of the section *Omorica* are phylogenetically older than those of the section Eurocea. Further, Picea is regarded as phylogenetically older than Abies.—
G. L. Cross.

2827. SCHWARZ, O. Nachträgliche Notiz zur Nomenklatur der europäischen Schwarzkiefer. Notizbl. Bot. Gart.

u. Mus. Berlin-Dahlem 14(121): 135-136, 1938.—A nomenclatorial discussion of Pinus maritima Mill, and P. nigra Arnold. The latter is invalid as it was published with a question mark. The "Schwarzkiefer" or Austrian Pine re-

mains P. austriaca Hösz.-H. St. John.

ANGIOSPERMAE (MIXED)

2827A. DIELS, L. Neue Arten aus Ecuador. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 14(121): 25-44. 1 fig. 1938.—A report on the collection from Ecuador by Dr. and Mrs. A. Schultze-Rhonhof. The following families are treated by the various authors: Araceae, Piperaceae by L. DIELS; Moraceae by J. MILDBRAED; Loranthaceae, Legumi-Moraceae by J. MILDBRAED; Lorantnaceae, Legumnosae, Euphorbiaceae, Guttiferae, and Melastomaceae by FR. MARKGRAF; Oenotheraceae, Sapotaceae, Solanaceae, and Gesneriaceae by R. MANSFELD; Bignoniaceae by L. DIELS; Acanthaceae by J. MILDBRAED; and Compositae by J. MATTFELD. New spp. or vars. are descr. in Anthurium, Dieffenbachia, Piper, Peperomia, Cousagoa, Phthirusa, Brounea, Tovomita, Conostegia, Blakea, Miconia, Funksin Vitellaria. Columnea. Allonlectus. Schlegelia.

Fuchsia, Vitellaria, Columnea, Alloplectus, Schlegelia, Aphelandra, Sciadocephala.—H. St. John.

2828. MILDBRAED, J. Neue und seltene Arten aus Ostafrika (Tanganyika-Territ. Mandat) leg H. J. Schlieben.

XIII. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 14(121):
94-112. 1938.—The following families are included: Gramineae by R. PILGER; Polygonaceae by J. MILDBRAED; Rutaceae, Combretaceae, Myrtaceae, and Sapotaceae by J. MILDBRAED; Melastomaceae by FR. MARKGRAF; and Convolvulaceae by G. K. SCHULZE-MENZ. New spp. are described or new combinations made in Loudetia, Setaria, Sorghastrum, Andropogon, Schizachyrium, Hyparthenia, Oxygonum, Vepris, Combretum, Syzigium, Tristemma, Mimusops, Ipomoea.—H. St. John.

2828A YUNCKER, T. G. A contribution to the flora of Honduras. Field Mus. Nat. Hist. Bot. Ser. Publ. 405 17(4): 287-407. 18 pl. 1938.—Reporting collections made by the

author in 1934 in the Lancetilla Valley and Tela regions, around Potrerillos and near Lake Yojoa, and in 1936 about Siguatepeque and adjacent mountains in the Department of Comayagua, this contribution enumerates Lichenes. Musci, Pteridophyta, and Spermatophyta. Included are new spp. in Ctenidium (1), Hypnaceae, by E. B. BARTRAM; in Dryopteris (1) and Polypodium (1), Polypodiaceae, and in Lycopodium (1), Lycopodiaceae, by W. R. MAXON; in Lycopodium (1), Lycopodiaceae, by W. R. MAXON; in Rynchospora (1), Cyperaceae, and Anthurium (3), Araceae, by P. C. STANDLEY; in Thecophyllum (1) and Tillandsia (3), Bromeliaceae, by L. B. SMITH; in Lepanthes (2), Orchidaceae, by O. AMES; in Peperomia (31) and Prince (22), Princepage and in Cyperomia (32). (2), Orchidaceae, by O. AMES; in Peperomia (31) and Piper (35), Piperaceae, in Quercus (8), Fagaceae, and in Phorandendron (2), Loranthaceae, by W. TRELEASE; in Thalictrum (1), Ranunculaceae, in Calliandra (3), Desmodium (1), and Rhynchosia (1), Leguminosae, in Zanthoxylum (1), Rutaceae, in Picramnia (1), Simarubaceae, in Ilex (1), Aquifoliaceae, in Cissus (1), Vitaceae, in Begonia (1), Begoniaceae, in Eugenia (2), Myrtaceae, in Blakea (1), Melastomaceae, in Frazinus (1), Oleaceae, in Vincetoxicum (2), Asclepiadaceae, in Physalis (1), Solanaceae, in Amphilophium (1), Bignoniaceae, in Columnea (1), Gesperiaceae. bohium (1), Bignoniaceae, in Columnea (1), Gesneriaceae, and in Anisomeris (1), Hoffmannia (1), and Psychotria (1), Rubiaceae, all by P. C. STANDLEY; and in Achyrocline (1), Verbesina (1), and Zexmenia (1), Compositae, by S. F. BLAKE.—F. W. Pennell.

MONOCOTYLEDONES

2829. ÅBERG, E. Hordeum agriccrithon, a wild sixrowed barley. Chronica Botanica 4(4/5): 390. 1938.

2830. AMES, O. Hintonella, a new genus of the Ornithocephaleae from Mexico. Bot. Mus. Leafl. Harvard Univ. **6**(9): 185-191. 1 pl. 1938.

2831. BURRET, M. Eine interessante neue Hyospathe-Art von Venezuela Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 14(121): 137-138. 1938.—Hyospathe bittieri.—H. St. John.

2832. CHERMEZON, H. Cypéracées récoltées par M. de Wailly au Soudan français. Bull. Soc. Bot. France 85(5/6): 365-370. 1938.—A list of 39 spp., vars., and forms, including

Pycreus waillyi.—E. L. Core.

2833. DANDY, J. E., and G. TAYLOR Studies of British Potamogetons. III. Potamogeton rutilus in Britain. Jour. Bot. 76(908): 239-241. 1938.

2834. HARMS, H., und J. MILDBRAED Eine Bromeliacee aus dem tropischen Westafrika. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 14(121): 118-119. 1938.—Pitcairnia feliciana (P. f. A. Chev.) is given as first certain record of a Bromeliaceae from Africa.—H. St. John.

2835. KENG, Y. L. New grasses from Peiling Miao, Suiyan Province, China. Jour. Washington Acad. Sci. 28 (7): 298-308. 4 fig. 1938.—Among grasses collected by Dr. Keng on the Roerich Expedition to Inner Mongolia were new species in Cleistogenes (2), Puccinellia (2), Agropyron

(1), and Stipa (1).—A. Chase.

2836. MASON, HERBERT L. The flowering of Wolffiella lingulata (Hegelm.) Hegelm. Madroño 4(8): 241-251. 3 pl. 1938.—After being interpreted as having lost the capacity to flower, plants of W. lingulata are reported as flowering in California. The flowers arise in a floral cavity in the top of the frond at one side of the reproductive pouch. The δ flower is a single stamen, the $\mathfrak L$ is a single pistil, both without perianth. The flowering is protogynous. The pistil breaks through the epidermal covering of the floral cavity, exudes a drop of liquid from the stigma, pollination is effected and the drop of liquid disappears. Next the stamen emerges from the cavity and dehisces its pollen. Pollination may be by wind or insect. The stages from seed germination through seedling and adult are described. The flowers are very much like those of W. oblonga reported from Argentina. No new characters are available from the flower, to aid in generic diagnosis.—H. L. Mason.

2836A. PERRIER de la BÂTHIE, H. Biogéographie des Palmiers de la région malgache. Bull. Soc. Bot. France 85(5/6): 384-393. 1938.—A résumé of the biogeography elucidated by earlier studies, especially those of H. Jumelle, of the palms of the Madagascar region. The biology, affinities, and distribution are discussed. Paleogeographic considerations based on the data at hand are presented .-P. D. Strausbaugh.

2837. MONOYER, A. A propos de Heleocharis multicaulis (Sm.) Sm. et de sa variété vivipare. Compt. Rend. Assoc.

Franc. Avanc. Sci. 60: 260-263. 1936(1937).
2838. RUPP, H. M. R. A new orchid for South Queensland, Acianthus ledwardii, sp. nov. Queensland Nat. 10

113-114. 1938.

2839. RUSSELL, W. Note sur la structure des feuilles de Xyris anceps Lam. Compt. Rend. Assoc. Franc. Avanc. Sci. 60: 263-264. Illus. 1936(1937).

2840. SCHULTES, R. E. Plantes Mexicanae. I. A new Lepanthes from Oaxaca. [L. rekoi R. E. Schultes sp. nov.] Bot. Mus. Leaft. Harvard Univ. 6(10): 193-195. 1938.

SMITH, LYMAN BRADFORD. Bromeliaceae. North Amer. Flora 19(2): 61-228 1938.—Keys and descriptions for 386 spp. and 7 vars. in 20 genera. Described as new: Hechtia lundelliorum, Tillandsia adscendens, based on T. ghiesbreghtii Smith (homonym) and T. mexicana, from Mexico; T. chlorophylla, from Guatemala; and Vriesia tonduziana, from Costa Rica; and Catopsis nutans var. stenopetala, n. status, based on C. stenopetala Baker.—H A. Gleason.

2842. WILLIAMS, L. O. A correction. Bot. Mus. Leaft. Harvard Univ. 6(9): 192. 1938.—Orchis constricta (1.c.5:

164) is a synonym of Habenaria camptoceras.

DICOTYLEDONES

2843. AUBREVILLE, A., et FR. PELLEGRIN. Sapindacées et Euphorbiacées nouvelles d'Afrique occidentale. Bull. Soc. Bot. France 85(5/6): 290-293. 1938.—New spp. in Gelonium (1), Phialodiscus (1), Lychnodiscus (1), Placodiscus (2), and Melanodiscus (1).-E. L. Core.

2844. BAKER, MILO S. An undescribed species of Viola from Utah. Madroño 4(6): 194-196. 1938.

2845. BALL, CARLETON R. New varieties and combinations in Salix. Jour. Washington Acad. Sci. 28(10): 443-452. 1938.—2 n. vars., from Alberta and Northern Canada, and Western U. S.; 2 n. combs.
2846. BENOIST, R. Nouvelles espèces de Planérogames

sudaméricaines. Bull. Soc. Bot. France 85(5/6): 408-410.

338.—4 spp. of Salpichroa are descr.—E. L. Core. 2847. BLODGETT, CHARLES O., and G. L. MEHL-QUIST. Color variation in Delphinium cardinale Hook. Madroño 4(7): 231-232, 1938.—An extensive natural colony of D. cardinale southeast of Lompoc, Santa Barbara County California, has, interspersed among the scarlet flowered plants, variants whose flowers range from lemon-yellow to orange-red. The variants form less than 10% of the

colony.—E. Crum.

2848. BOLLE, FRIEDRICH. Lyonothamnus als Vorstufe der Sanguisorbeen. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 14(121): 53-65, 1 fig. 1938.—This curious endemic of the Channel Islands off southern California, Santa Catalina, etc., is illustrated and its structure described. The genus belongs in the Rosaceae, in the Spiraeoideae or the

Sanguisorbeae between them.—H. St. John. 2849. BROWN, J. R. Notes on Haworthias. (cont.) Cactus and Succulent Jour. 9(12): 196-197. Illus. 1938.— H. cuspidata.

2850. BROWN, J. R. Notes on Haworthias. (cont.) Cactus and Succulent Jour. 10(2): 19. Illus. 1938.—H.

2851. BUTTERFIELD, H. M. The introduction of Acacias into California. Madroño 4(6): 177-187. 1938.—Acacias are so universally cultivated in California that they have become a characteristic feature of the landscape. seed lists and newspaper accounts reveal that at least 4 spp. of Australian Acacia were growing in California by 1855. Warren, the O'Donnell Brothers, Walker and other nursery men listed seeds of these and a few additional spp. before 1860. 70 spp. and vars., the largest number available commercially before or since, were offered for sale in 1861. The importation of young trees began about 1859. The first introductions were at San Francisco and Oakland but other centers of commercial distribution soon arose at Santa Barbara, Los Angeles and San Diego.—L. Constance. 2852. CHASSAGNE, M. Deux Salix nouveaux marocains.

Bull. Soc. Bot. France 85(5/6): 402-403. 1938.—Salix Jahan-diezi Chass, S. purpurea L.—E. L. Core. 2853. COPELAND, H. F. The structure of Allotropa.

Madrono 4(5): 137-153. 5 pl., I fig. 1938.—Allotropa, a monotypic saprophytic genus of Ericales, occurs from British Columbia to California, at elevations from sea level to 8000 or 9000 feet, in forests either of *Lithocarpus* or of conifers. The roots seen are without mycorrhiza, have a root cap, a 4-arch xylem, and endogenous branches. The unbranched shoots arise as endogenous adventitious buds. The stele is a siphonostele with a sheath of fibers within and without; the structure of leaf- and branch-traces varies in a regular manner along the length of the stem. The leaves and bracts form an irregular spiral. The inflorescence is a raceme. Pedicels in some cases bear 2 bractlets. The perianth is usually of 5 separate members, shown to be petals. Stamens are usually 10, the anthers turning upside down during development. The pistil, usually of 5 carpels, bears nectaries projecting between the filaments; placentation is axile below, parietal above; there is an internal sheath of fibers. The brief style is traversed by a fluted channel; the lobes of the stigma are the ends of the carpels. Ovules and seeds, the latter with tails at both ends, are much as in related plants. Dehiscence of the capsule is by a lengthwise rip in each carpel, and also by a circumferential rip about the base of the style. This genus combines many characters found separately in other saprophytic Ericales.-H. F. Copeland.

2854. DAYTON, WILLIAM A. A cranberry from the Tahoe National Forest. Madroño 4(7): 201-203.1 pl. 1938. -Oxycoccus macrocarpos, a species previously unreported

from California.—E. Crum.

2856. DÜCKE, A. Die Gattungen Coumarouna Aubl. und Taralea Aubl. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 14(121): 120-127. 1938.—A revision of the two South American genera. Coumarouna belongs in the Dalbergieae, Taralea in the Galegeae. von Schreber erred in uniting them into the genus Dipteryx. A new species is described in Coumarouna.—H. St. John.

2857. EPLING, CARL. Notes on Stachys rigida Nutt. Madroño 4(8): 270-272. 1938.

2858. FOSBERG, F. R. Notes on Plants of the Pacific Islands. I. Bull. Torrey Bot. Club 65(9): 607-614. 1938.— Taxonomic notes on plants of Polynesia, Melanesia, and Micronesia, including Gouania mangarevica (Rhamnaceae), a new section and a new name for an old section in Diospyros subgen. Maba (Ebenaceae), several new vars. and new combs. in *Diospyros*, and critical notes on *Randia* (Rubiaceae).—F. R. Fosberg.

2859. FOSBERG, F. RAYMOND. Two Queensland Ixoras.

Jour. Bot. 76(908): 233-237. 1938.—Taxonomic note. Ixora

trifora R. Br. (not Seem.) becomes I. queenslandica Fos-

berg. I. biflora.—F. R. Fosberg.

2860. FOSBERG, F. RAYMOND. Eriogonum Abertianum and its varieties. Madroño 4(6): 189-194. 1938.

2861. GAGNEPAIN, F. Treize especies nouvelles d'Extreme-Orient. Bull. Soc. Bot. France 85(3/4): 165-171. 1938.—New spp. are described in Holboellia (1), Mahonia (1), Podophyllum (3), Cisampelos (1), Coscinium (1), Cyclea (2), Pridania (2), Stephania (1), and Saurauja (1). E. L. Core.

2862. GATES, H. E. A new species. Mammillaria insularis sp. nov. Cactus and Succulent Jour. 10(2): 25-26. Illus.

2863. GILG, CHARLOTTE. Beiträge zur Kenntnis der Gentianaceen-Gattung Curtia Cham. et Schlecht. Notizbl. Bot. Gart. Mus. Berlin-Dahlem 14(121): 66-93.1 fig. 1938.—A detailed discussion of the floral morphology of the S. American genus Curtia. C. patula and C. tenuifolia are described as occurring with short, intermediate, or longstyled forms.—H. St. John.

2864. LEONARD, E. C. New species of Elytraria from the West Indies and Peru. Jour. Washington Acad. Sci. 28(7): 308-313. 5 fig. 1938.—Consists of a treatment of the W. Indian Elytraria with key and descriptions of 3 new spp. One new species of Elytraria from Peru is also descr.—E. C. Leanard.

2865. MACBRIDE, J. FRANCIS. Flora of Peru. Field Mus. of Nat. Hist. Bot. Ser. Publ. (428) 13(Pt. 2, no. 3):

1-1136. 1938.—This installment deals with the families from the Berberidaceae to the Connaraceae, giving keys, descriptions and citations of specimens. It includes new spp. or specific combinations in Berberis (2); Sciadotenia (1), and specific combinations in Berberis (2); Sciadotenia (1), and Abuta (1) by MOLDENKE; Guatteria (11), Unonopsis (1), and Xylopia (1), in Annonaceae, family (p.700-766), contributed by ROBERT E. FRIES; Siparuna (1) by STANDLEY; Beilschmiedia (1), and Aniba (2) by KOSTERMANS; Bocconia (1), genus (p.934-936) by P. C. STANDLEY; Cremolobus (1), Rorippa (4), Englerocharis (3); Podandrogyne (1) by MACBRIDE, and Cleome (1) by GILG; Crassula (1) by STEYERMARK; Brunellia (1) by GILG; Crassula (1) by STEYERMARK; Brunellia (1) by BAEHNI; Weinmannia (1); Hesperomeles (1); Licania (2) by MACBRIDE and by PILGER; Hirtella (1) by BAEHNI & MACBRIDE; Potentilla (1); Aphanes (1) by ROTHMALER; Margyricarpus (1); Rourea (1) (Con-ROTHMALER; Margyricarpus (1); Rourea (1) (Connaraceae), family (p.1119-1125) by JULIAN A. STEYER-MARK. The account of the Myristicaceae (p.766-784) was MARK. The account of the Myristicaceae (p.766-784) was contributed by ALBERT C. SMITH, and of the Fumariaceae (p.936-937) by J. A. STEYERMARK. "Additions and Corrections" (p. 1126-1136) include new spp. in Peperomia (1) by TRELEASE; and in Heisteria (1) by STANDLEY.—F. W. Pennell.

2866. McMINN, H. E. Ceanothus thyrsiflorus: Extensions of the Market (C) 1020 1020

sion of range. Madroño 4(6): 199. 1938.
2867. MARKGRAF, FR. Neue Apocynaceen aus Südamerika. VII. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 14(121): 128-132. 1938.—New spp. are descr. in Aspidosperma, Galactophora, Prestonia, Odontadenia, and Gonolobus.—H. St. John.

2868. MASON, HERBERT L. Two new species of Linanthus from Western North America. Madroño 4(5):

157-162 1 pl. 1938. 2869. MASON, HERBERT L. A hybrid Eriogonum.

Madroño 4(8): 290. 1 pl. 1938.

2869A. MATTICK, FRITZ. Die Verbreitung des Hederich (Ackerrettich, Raphanus Raphanistrum, und Ackersenf, Sinapis arvensis) in Deutschland. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 14(121): 1-24. 1938.—A detailed discussion, listing and mapping of the distr. of the weeds R. raphanistrum and S. arvensis in Germany.—H. St. John.

2870. MILDBRAED, J. Neue Arten aus dem Matengo-Hochland, stidwestliches Tanganyika-Terr., leg. H. Zerny. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 14(121): 113-117. 1938.—New spp. are descr. in Rhynchosia, Vigna, Sweettia, Schizoglossum, and Xysmalobium.—H. St. John. 2871. MORRISON, JOHN L. Studies in the genus Streptorthes.

tanthus Nutt. I. Two new species in the section Euclisia Nutt. Madroño 4(7): 204-208, 1 pl. 1938.

2872. MORTON, C. V. Notes on Cremosperma. Jour. Wash. Acad. Sci. 28(8): 348-349. 1938.—C. sylvaticum n. sp. (Colombia), C. auriculatum n. sp. (Ecuador), and C. cestroides (Fritsch) comb. nov.—C. V. Morton.
2872A. MUGNIER, LOUIS. Roses des Ardennes. Bull.

Soc. Bot. France 85(5/6): 380-382. 1938.—A list of species.—

E. L. Core.

2873. NANDI, H. K. Studies in the Podostemonaceae of the Khasi hills, Assam. I. Calcutta Univ. Jour. Dept. Sci. 1(1): 25-51. 5 pl. 1937.

2874. OHWI, JESABURO. The genus Ophiorrhiza of Japan. Acta Phytotax. Geobot. 7(3): 195-196. 1938.—A key in Japanese.—E. H. Walker.

2875. PHILLIPS, H. M. Karyology and the phyletic relationships of the Plumbaginaceae. Chronica Botanica

4(4/5): 385-386. 1938.

2876. QUICK, CLARENCE R. Notes on the genus Ribes

in California. Madroño 4(8): 286-290. 1 pl. 1938.
2877. ROBINSON, G. W. Some scarlet, red and pink
Penstemon species. Gard. Chron. [London] 104(2702): 272, 1938

2878. ROLLINS, REED C. Glaucocarpum, a new genus in the Cruciferae. Madroño 4(7): 232-235. 1 pl. 1938.

2879. SCHWARZ, O. Quercus atropatena Schwz. et Hess, eine neue Eiche Südkáspiens. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 14(121): 133-134. 1938.—A new species of Quercus from northern Persia.—H. St. John.
2880. SHARSMITH, HELEN K. The native Californian species of the genus Coreopsis L. Madroño 4(7): 209-231.
1 pl., 1 fig. 1938.

2881. SLEUMER, HERMANN. Die Gliederung der Flacourtiaceae-Prockiinae Gilg. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 14(121): 45-52. 1938.—A description of the subtribe and a new key including the recently described genera. New spp. or vars. are descr. or new combinations are made in *Prockia*, *Hasseltia*, **NEOSPRUCEA** (Spruce-anthus Sleumer, not Verdoorn), Banara, HASSELTIOPSIS with 3 spp. of Central or South America. All the plants are from Central or South America.—H. St. John.

2881A. SONCK, C. E. Utricularia-formerna i Pielisjärvi. Memoranda Soc. Fauna et Flora Fennica 13(1936/37): 26-30. Illus. 1938.—Forms of Utricularia at Pielisjarvi.

2882. STANDLEY, PAUL C. Flora of Costa Rica. Field Mus. Nat. Hist. Bot. Ser., Publ. 420 18(3): 783-1133. 1938.

—Considers families from Melastomaceae to Orobanchaceae, giving descriptive and distributional notes for each species. Included are new species or specific combinations in Chaetolepis (1), Clidemia (1), Conostegia (2), Miconia (1), Ossaea (2), and Topobea (2), Melastomaceae; in Clethra (1), Clethraceae; in Vaccinium (3), Ericaceae; in Ardiia (5), Myrsinaceae; in Bumelia (1), and Dipholis (1), Sapotaceae; in Symplocos (2), Symplocaceae; in Halenia (1), and Macrocarpaea (1), Gentianaceae; in Rauwolfia (1), and Tabernaemontana (1), Apocynaceae; in Marsdenia (1), Metastelma (1), and Vincetoxicum (2), Asclepiadaceae; in Metastelma (1), and Vincetoricum (2), Asclepiadaceae; in Cordia (3), Ehretia (1), and Tournefortia (3), Boraginaceae; in Clerodendron (1), Duranta (1), and Lippia (3), Verbenaceae; in Lepechinia (1), and Salvia (1), Labiatae; in Athenaea (1), Capsicum (8), Lycianthes (6), Markea (1), Solanum (12), and VALERIOA (1), Solanaceae (by P. C. Standley and C. V. Morton); in Calceolaria (1), and Castilleja (1), Scrophulariaceae; and in Enallagma (1), and Schlegelia (1), Bignoniaceae.—F. W. Pennell.

2883. STEBBINS, G. LEDYARD Jr. An anomalous new species of Lapsana from China. *Madroño* 4(5): 154-157.

1 pl. 1938.

2884. STEBBINS, G. LEDYARD Jr. The Western American species of Paeonia. Madroño 4(8): 252-260. 1 pl. 1938. 2885. STEYERMARK, JULIAN A. Studies of the American Flora. I. Field Mus. Nat. Hist. Bot. Ser., Publ. Att 17(5): 411-443. 1 fig. 1938.—MORTONIODENDRON Standley and Steyermark (Tilaceae), from Panama, and species of Conceveiba (3) from Brazil; Mabea (4) from Peru, Colombia, and Brazil; Richeria (1) and Drypetes (1) from Brazil; Mendoncia (1), Viguiera (1) from Mexico, and Selenia (1) from Texas, are descr. There is a discussion of the gross morphology of Grindelia. Supplemental to the author's "Studies in Grindelia," and discusses morphology of vegetative and reproductive structures.—F. W. Pennell.

2886. TROCHAIN, J. Elatine triandra Schkuhr var. major nov. var. (Elatinaceae) au Senegal. Compt. Rend. Assoc. Franç. Avanc. Sci. 60: 342-345. Illus. 1936(1937).

2887. WALTHER, E. Notes on Crassulaceae. New combinations in two genera. Cactus and Succulent Jour. 10(2): 22-24. Illus. 1938.—Villadia and Altamiranoa.

2888. WHEELER, LOUIS C. Eremocarpus Bentham: Preoccupied? Madroño 4(8): 272-273. 1938.

FLORISTICS AND PLANT DISTRIBUTION

2889. BALLENDEN, S. St. C. Um'Doni or waterwood (Syzygium cordata). Jour. S. African Forestry Ass'n 1: 60-61. 1938.—The tree occurs in swamps along the coast of Natal and Zululand and extends inland along the rivers. The wood is durable in water but decays quickly in the

ground.—W. N. Sparhawk.

2890. COMAN, ARTUR. Contributium la flora Maramureșului. [Flora of Maramureș.] Rev. Pădurilor [Bucharest] 50(10): 872-873. 1938.—Among the interesting plants in this mountain region of northern Rumania are: Sesleria heusteriana, Salix herbacea, Oxyria digyna, Silene nivalis, Aquilegia vulgaris v. nigricans, Aconitum anthora, Fragaria vesca, Waldsteinia ternata, Primula farinosa, Armeria elongata, and Veronica fruticans.—W. N. Sparhawk.

2891. COMAN, ARTUR. Floarea reginei in Maramureș. [Leontopodium alpinum Cass. in Maramures.] Rev. Pădurilor [Bucharest] 50(10): 874, 1938.—L. alpinum occurs in only 3 places in the Maramures region of northern Rumania. 2892. GALIANT, M. Plantes rares du Sud-Ouest de la France. Bull. Soc. Bot. France 85(5/6): 311-316, 1938.

2893. GANDER, FRANK F. Notes on some San Diego County [California] endemics. Madroño 4(5): 163-165. 1938.—New locality records for 20 spp. of Spermatophytes.—E. Crum.

2894. GILLILAND, H. B. A proposed delimitation of botanical counties for Southern Rhodesia. Jour. S. African Bot. 4(2): 65-71. Map. 1938.—A brief definition of 17 areas in S. Rhodesia, with notes, to serve as a guide to field collectors. The field sources of the chief existing collections are noted.—H. B. Gilliland.

2895. LEMBERG, B. Märkligare växtfynd från östra Nyland. Memoranda Soc. Fauna et Flora Fennica 13(1936/37): 9-19. Illus 1938—Records of flowering plants

37): 9-19. Illus. 1938.—Records of flowering plants.
2897. MUENSCHER, W. C. Additions to our knowledge of the flora of Mount Baker, Washington. Madroño 4(8): 263-270. 1938.—Adds 13 families, 90 genera and 228 spp.; previously recorded (1929) number of species, 334.—E. Crum.

2901. STEENIS, C. G. G. J. van. Recent progress and prospects in the study of the Malaysian flora. *Chronica Botanica* 4(4/5): 392-397. 1938.

2902. TALLON, G. Sur quelques caracteres de la végétation de la Camarque. Compt. Rend. Assoc. Franç. Avanc. Sci. 60: 339-342. 1936(1937).

2903. TOLSTEAD, WILLIAM L. A flora of Winneshiek and Allamakee Counties and Clayton County in the vicinity of McGregor. Iowa State Coll. Iour. Sci. 12(3): 321-384. 2 pl. 1938.—The survey is reported in annotated systematic list of 846 plants, among which were 33 spp. of Musci, 31 Pteridophyta, 81 Gramineae, 40 Cyperaceae, 39 Rosaceae, 37 Leguminosae, 20 Umbelliferae, 25 Labiatae and 108 Compositae. Two species new to the state were recorded and the range of several spp. extended in the state. The range and representation of the flora are significant in relation to the climate, the geological and glacial history of the region, and the resultant peculiar erosional topography and the soils.—W. L. Tolstead.

2904. VERHOEF, L. De boomsoorten behoorende tot het geslacht Adina. [Species of the genus Adina.] [With Eng. summ.] Tectona 31(11): 802-814. 1938.—4 Adina spp. occur in Netherlands East Indies: A. minutiflora (A. rubescens), A. polycephala, A. fagifolia, and an unidentified sp. Notes on distrib. and economic value are included.—W. N. Sparhawk.

MORPHOLOGY AND ANATOMY OF VASCULAR PLANTS

(See also in this issue Entries 1741, 1745, 1747, 2826, 2839, 2853, 3030)

✓2905. BERTRAND, P., et P. CORSIN. Phylogénie des végétaux vasculaires. Bull. Soc. Bot. France 85(5/6): 331-348. 1938.—The comparative anatomy of vegetative organs, the comparative ontogeny of young plants, the comparative morphology of reproductive organs, and the comparative embryology of plants in general together serve to demonstrate the early isolation of all the great groups of vascular plants. Palaeontological studies show that there have been since the Cambrian numerous appearances of vascular plants, each group completely independent of the other. The article includes 6 phylogenetic tables.—E. L. Core. 2906. FRIEDEL, JEAN. Note sur la structure anatomique

2906. FRIEDEL, JEAN. Note sur la structure anatomique du Pteridophyllum racemosum Sieb. et Zucc. Bull. Soc. Bot. France 85(5/6): 406-408. 1938.—This preliminary study reveals an anatomical structure characteristic of the Papaveraceae. Absence of a laticiferous system is a feature of the gub family. Hymogoidese. P. D. Streebengel.

of the sub-family Hypecoideae.—P. D. Strausbaugh.

2907. KAUSIK, S. B. Pollen development and seed formation in Utricularia coerulea L. Beih. Bot. Centralbl. Abt. A 58(3): 365-375. 3 pl., 11 fig. 1938.—In the young anther a single sporogenous band is differentiated which gives rise to the microspore mother cells. The pollen grains at time of shedding have each a large tube nucleus and 2 spindle-shaped & cells. N=20. Innumerable anatropous ovules, each with a single integument, are formed all over the central placenta. The embryo-sac projects beyond the integument and the micropylar end containing the eggapparatus is therefore exposed. Fertilization takes place in the cavity of the ovary. The polar nuclei and the 2d & nucleus may fuse in one of 3 ways described. The fertilized egg is externally situated and forms a tube for carrying the nucleus deep into the embryo-sac where the embryo is formed. The tube of the fertilized egg is descr. In the formation of the endosperm, the embryo-sac is first divided into 2 primary chambers both of which contribute to the formation of endosperm. This is a departure from the usual method. The micropylar and chalazal haustoria are later differentiated from the primary chambers. The micropylar haustorium is massive and more pronounced than the chalazal haustorium.—Auth. summ.

chalazal haustorium.—Auth. summ.

2908. MARTENS, P. Nouvelles recherches sur l'origine des espaces intercellulaires. Beih. Bot. Centralbl. Abt. A 58(3): 349-364. 24 fig. 1938.—The study of the secondary meristem and of certain tissues in division in Rosa, Helianthus annuus, Beta vulgaris and Dahlia variabilis has shown that the middle lamella of the more recent division is unable to unite at first with that of an older division which is perpendicular to it, the latter being already covered by a certain thickness of cellulose wall. There is then formed, within this lamella, a small intramembranal cavity, which afterward rejoins either the older middle

lamella or a cavity, either a cavity already formed at the surface of this lamella, or an enlargement and deformation of this cavity. These observations confirm and establish those previously made for various tissues of other species and which have been extended, indirectly and with certain variations, to primary meristems with thin walls ("La Cellule" 46, 355-388, 1937 and cf. Jungers, Ibid, 111-122). All these facts imply the rejection of the classic conception of the origin of intercellular spaces. In dividing cortical parenchyma of rose and dahlia certain figures imply a variation of the preceding process the same result being obtained without the intervention of an intermembranal cavity.

tained without the intervention of an intermembranal cavity.—Auth. summ. (tr. by H. F. Bergman).

2909. NORDHAGEN, ROLF. Studien über die monotypische Gattung Calluna Salisb. I. Ein Beitrag zur Bicornes-Forschung. Bergens Mus. Arbok Naturvidenskapelig Rekke 1937(2, paper 4): 1-55.3 pl., 17 fig. 1937(rec'd 4-2-38).

—I. Survey of the branch structure of the heather. Definitions follow Malme (1908) and Holmboe (1909). First year shoots consist of elongate primary and short lateral axes, and have basal and apical vegetative zones and central floro-vegetative zone. The latter is not an inflorescence because the floriferous branches bear normal leaves. The term "Blütenzweigsammlung" (collection of floriferous branches) is proposed instead.—II. Relationships between the "Blütenzweigsammlung" (collection of floriferous branches) is proposed instead.—III. Relationships between the "Blütenzweigsammlung" (collection of floriferous branches) is proposed instead.—III. Relationships between the "Blütenzweigsammlung" (collection of floriferous branches) is proposed instead.—III. Relationships between the "Blütenzweigsammlung" (collection of floriferous branches) is proposed instead.—III. Relationships between the "Blütenzweigsammlung" (collection of floriferous branches) is proposed instead.—III. Relationships between the "Blütenzweigsammlung" (collection of floriferous branches) is proposed instead.—III. Relationships between the "Blütenzweigsammlung" (collection of floriferous branches) is proposed instead.—III. Relationships between the "Blütenzweigsammlung" (collection of floriferous branches) is proposed instead.—III. Relationships between the "Blütenzweigsammlung" (collection of floriferous branches) is proposed instead.—III. Relationships between the "Blütenzweigsammlung" (collection of floriferous branches) is proposed instead.—III. Relationships between the "Blütenzweigsammlung" (collection of floriferous branches) is proposed instead.—III. Relationships between the "Blütenzweigsammlung" (collection of floriferous branches) is proposed instead.—III. Relationships between the "Blütenzweigsammlung" (collection of floriferous branches) is proposed instead.—III. Relationships between the "Blütenzweigsammlung" (collection of floriferous branches) is proposed instead.—III. Relationships between the "Blütenzweigsammlung" (collection of floriferous branches) is proposed instead.—III. Relationships branches (collection of floriferous branches) is proposed instead. is proposed instead.—II. Relationships between the "Blütenzweigsammlung" and the intermediate bracts. a. Basal, intermediate and subfloral bracts on single- and several-flowered axes. Definitions, particularly of the "Vorblätter" (basal bracts), follow Eichler. The basal bracts are foliaceous, the others gradually less so. The intermediate bracts are usually 2 pairs, never less. Calluna is obdiplostemonous and usually obdiplosepalous. The last 2 pairs of bracts ("Kelchanschluss") form a pseudocalyx while the calyx has become petaloid. When the branches are 3- or 5-flowered they represent a reversion and the branches are 3- or 5-flowered they represent a reversion and the branchlets always bear more than 2 pairs of intermediate bracts. b. Comparison of Calluna, Bruckenthalia and Erica; the presence of intermediate bracts in other Ericaceae. Bruckenthalia differs from Calluna in its lack of basal and intermediate bracts and in its deciduous subtending bracts. Erica differs by its lack of intermediate bracts and some species by having the subtending bracts adnate. Other spp. of Ericaceae with intermediate bracts occur in Cassione, Pemettya, Gaulteria, Epigaea, Semiramisia, Englerodoxa, Ceratostema, Disterigma, Lateropora, Mycerinus and Thibaudia. They are characteristic of the closely allied Epacridaceae. occur in the Empetraceae, Pyrolaceae and Monotropoideae. c. The bending of the floriferous branches. The 4-ranked floriferous branches are turned sharply to one side, forming a bright half-cylindric mass offsetting the smallness of the individual flower. III. Zygomorphy and exsertion of the

Calluna-flower; peculiarities of the corolla. The pistil and stamens are bent up, the corolla is asymmetric by a saccate base, but the calyx is regular. The bending is negatively geotropic and serves to ensure pollination by bringing the anther-appendages into a functional position. The lines of thickening extend the whole length of the outer epidermal cells of the corolla-lobes, and serve to stiffen them as they spread the sepals apart. Cell thickenings at the base of the corolla make it persistent. The opening of the flowers depends primarily on humidity, and is effected by the swelling of corolla-tissues. This probably accounts for the geographical distribution of Calluna. IV. Biological dispersal studies; the form of the enclosing calyx and of the capsule; sowing of the seed. Previous ideas of the dispersal of Calluna are erroneous because based on incomplete observation. After anthesis the sepals change shape and form a container about the rest of the flower. But the persistent corolla keeps an opening in the top of this container. The capsule is globose and septicidal, with 5-8 seeds in a cell. The calyx serves as an outer capsule and prevents the seeds falling straight to the ground. By the beginning of December 95% of the calyces are emptied of seeds. The seeds are wingless and poorly adapted to wind-dispersal. -L. B. Smith

2910. PITOT, A. L'ovaire d'Heliotropium europaeum L. Bull. Soc. Bot. France 85(5/6): 394-400. 12 fig. 1938.—The classical interpretation of the ovary of the Boraginaceae is not applicable to the ovary of *H. e.*, which is hollow at its center. The median cavity and those of the nutlets where the ovules lie communicate freely by a sclerified canal.—

P. D. Strausbaugh.

2911. PRIVAULT, DANIEL. Action du milieu sur l'épiderme des cotylédons du Pin Pignon. Bull. Soc. Bot. France 85(5/6): 309-311. 1938.—The embryos of Pinus pinea deprived of their endosperm and cultivated in sterile media, in darkness, generally present some anomalies, especially in the formation of stomata. For the most part these anomalies disappear if the culture medium contains a sufficient separation of stomate.

ficient proportion of glucose.—P. D. Strausbaugh.
2912. RAUH, WERNER. Gentiana terglouensis Hacquet, ein neuer Fall von schiefer Wirtelbildung. Ber. Deutsch. Bot. Ges. 56(7): 267-274. 1938.—Oblique decussation has been reported only for the representatives of the Crassulaceae (Crassula, Kalanchoe, Cotyledon, and Rochea). The author reports oblique decussation in the alpine form Gentiana terglouensis. The morphology of the growing contribution in the latest that the complex of the Crassulaceae. point is similar to that of the Crassulaceae. Oblique decussation is a result of the bilateral structure of the growing point. The growth form of G. terglouensis is discussed.—
H.C. Beeskov.

2913. SANCHEZ, S. T. Embryo sac development in Euphorbia heterophylla limaeus. Univ. Philippines Nat. and Appl. Sci. Bull. 6(1): 59-75. Illus. 1938.

2914. SOUÈGES, RENÉ. Embryogénie des Illécébracées. Développement de l'embryon chez le Herniaria glabra L. Bull. Soc. Bot. France 85(5/6): 353-363. 43 fig. 1938.—In H. glabra the embryogenic laws are closely analogous with those observed in Sagina procumbens and Scleranthus perennis, but they differ from these in the destiny of the cells of the tetrad. In this respect the closest relationship is with Papaver rhoeas. In the cycle of forms whose development depends on the sequence of events arising in the apical cell, H. glabra would correspond to P. rhoeas in the cycle of forms governed by the laws applying directly to the primordial embryonic cell.—P. D. Strausbaugh.

2915. SOUÈGES, R. Embryogénie des boragacées. Développement de l'embryon chez le Lycopsis arvensis L. Compt. Rend. Acad. Sci. [Paris] 207(15): 640-642. Illus.

2916. SPANNER, LUDWIG. Ein Beitrag zur Morphologie einiger Myrmecodien. Beih. Bot. Centralbl. Abt. A 58(3): 267-290. 8 fig. 1938.—This paper deals with the morphology of Myrmecodia platytyrea, M. antoinii, M. echinata and Hydnophytum formicarium. Anamorphosis proceeds in the reverse of the order given; M. p. and M. a. are apparently end members of 2 developmental series. The evolution of the stipules on the growing point, the occurrence and functions of the leaf cushions or "Cauli clypeolati," and the structure of the mesophyll are discussed. The following features are discussed as applying primarily to *M. platytyrea*: the nature of the thorn emergences on the tuber and on the leaf, the structure of the seed coats, the course of the vascular bundles in the stem, the character of the conducting elements, the origin of phelloderm, the hydathode-like excrescences on the leaf cushions and on the tubers, the

stomata, vivipary and the origin of flowers.—H. F. Bergman.
2917. TURNBULL, JOHN M. The influence of age on
summerwood ratio in pine timber. A quantitative consideration of apical incidence. Jour. S. African Forestry
Ass'n 1: 53-59. 2 fig. 1938.—Apical incidence is defined as the transverse projection of a tendency in the summerwood incremental sheaths to taper in ascent. This tendency has been demonstrated in several spp. of pines.—W. N.

Sparhawk.

AGRONOMY

Editor: CARLETON R. BALL. Associate Editors: M. A. McCALL, Crops; R. B. DEEMER, Soils

(See also in this issue Entries 1690, 1740, 1743, 1756, 1825, 2494, 2829, 3004, 3010, 3031, 3053, 3079, 3081, 3101, 3134, 3135)

CROP SCIENCE (ARVICULTURE)

2918. ANDERSON, J. ANSEL, et al. Observations on the study of varietal differences in the malting quality of barley. II. III. Canadian Jour. Res. Sect. C. Bot. Sci. 16(6): 234-240. 3 fig.; (6): 248-252. 1938.—II. Samples of O.A.C. 21 and Wisconsin 38 barley from 2 stations were germinated at 56° and 50° F with 44.5% moisture, and with 44.5 and 42.5% moisture at 53°F. Aliquots were kilned and analyzed after 3, 5, 7, 9, 11 and 13 days. Data for extract, diastatic power, and permanently soluble N, as percentage of wort solids, were plotted against time. Both vars. responded in almost exactly the same manner to changes in temp. and moisture. Values for O.A.C. 21 were consistently higher, but paired curves, representing samples of both vars. from the same station, became closer with increasing time, owing largely to overmodification of the O.A.C. 21. A real difference in malting quality between these 2 vars, greater than the differential effect of malting method on them, is therefore indicated.—III. Samples of 8 barley vars. grown at 6 widely separated points in Canada were malted in duplicate under standard conditions in laboratory equipment. After 6 days in the germinator, half of each sample was removed and kilned. The remaining halves were grown 2 days longer before kilning. The relative positions of the vars. with respect to extract, diastatic power, and permanently soluble N, were changed by the additional 2 days' growth, but the changes were generally small by comparison with the spreads between vars. and the greater changes in their relative positions when grown at different stations. The differential effect of malting method is an appreciable source of error in the interpretation of the results of routine malting tests, but the limiting factor in studies of the comparative malting qualities of vars. is the differential effect of environment on them. -Auth. abst.

2919. ARDITTI. Influence du nitrate de soude sur le tabac. Compt. Rend. Acad. Agric. France 24(9): 352-356. 1938.

2920. ARMSTRONG, S. F. Trials of autumn-sown wheats, 1931-1937. Jour. Nation. Inst. Agric. Bot. 4(3): 238-265. 1938.

2921. BARTEL, A. T., and J. H. MARTIN. The growth curve of sorghum. Jour. Agric. Res. 57(11): 843-849. 1938.-Growth rates of 4 sorghum vars. in an irrigated field were studied at Tucson, Ariz., in comparison with corn and proso. About 10 to 15% of the dry weight of the sorghum stalks was produced during the first half of the growing period. The apparent early slow growth of sorghum as

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compared with corn appeared to be due to the smaller seed size. The logarithm of the weight per stalk of 10-day-old seedlings of corn, sorghum and proso was directly proportional to the logarithm of weight per seed.—J. H. Martin.

2922. BORDEN, R. J. The plant food value of nitrogen in filter cake. Hawaiian Planters' Rec. 42(2): 111-118.5 fig. 1938.—The N content of the filter cake applied in these exps. had not become available after the added material had been 6 months in the soil. Even a 2d cropping of this soil failed to show the desired residual effect or to indicate further availability of the N supplied with the filter-cake applications which preceded the 1st crop.—H. C. Waterman (courtesy Exp. Sta. Rec.).

2923. BORDEN, R. J. Some sugar yield relationships. Hawaiian Planters' Rec. 42(2): 125-128. 4 fig. 1938.—The relations between the sugar yields of H 109 sugarcane and the crop of a field cycle, month of starting a crop, month of harvest, and age of the crop were detd. from 10 yrs. of field records. Unless field costs are concerned with decisions to plow out old ratoons, little seems to be gained by plowing and replanting H 109 except when the sugar-peracre-per-month yields are falling below the normally expected values. Optimum sugar yields from H 109 cane under the climatic conditions of the Waialua district should be obtained from 24 months' cropping and when the fields are started and harvested between Feb. and July.—H. M.

Steece (courtesy Exp. Sta. Rec.).
2924. BRANDRETH, B., and J. W. DALLAS. Bedford-shire potato trials, 1936/37. Jour. Nation. Inst. Agric. Bot. 4(3): 304-306. 1938.

2925. BYERS, H. G., J. T. MILLER, K. T. WILLIAMS, and H. W. LAKIN. Selenium occurrence in certain soils in the United States, with a discussion of related topics. III. U. S. Dept. Agric. Tech. Bull. 601. 1-75. 15 fig. 1938.— Results are reported of a reconnaissance survey of parts of Kansas, Colorado, New Mexico, Arizona, and Utah, which establish the existence of seleniferous areas in these states. A more detailed examination of eastern Colorado reveals the existence of a soil area of upwards of 3,000 sq. mi. which is capable of producing some vegetation toxic to animals. A similar, though less extensive, area is shown to exist in northeastern New Mexico. Additional evidence is presented indicating wide differences in the Se content of different parts of the same plant and between different plants on the same soil, also a seasonal variation in the Se content of plants. Data are given which show that irrigation is a remedial measure for seleniferous soils and that irrigation drainage waters remove soluble Se from soils which contain it. The Se content of 20 soil profiles is reported, and the evidence shows no constant relation in the distribution of the Se within the soil profile. A summary is presented of observations of the plant associations found in seleniferous areas, from which it is inferred that the relative quantities of plant spp. and perhaps also the presence of certain spp. are influenced by the Se present in soils. A recapitulation is included which offers a general outline of the facts established by, and of certain inferences which may be drawn from, available data.—K. T. Williams.

2926. CLARK, W. A. The identification of commercial

2926. CLARK, W. A. The identification of commercial barleys of the middle-west. *Brewers Digest* 13(9): 19-24. Illus. 1938.

2927. COLE, JOHN S. Correlations between annual precipitation and the yield of spring wheat in the Great Plains. U. S. Dept. Agric. Tech. Bull. 636. 1-39. 1 fig. 1938. —Data covering a total of 387 crop-years, 1906-1935 inclusive, at 19 field stations in the Great Plains are given of precipitation for the year ending July 31 and 3 indexes of yield of spring wheat. The primary study is made with an index of the average yields of about 30 plots representing low-, medium-, and high-yielding methods. Less detailed studies are made with the average yields of continuously cropped plots, a low-yielding method, and an average of yields on fallowed land, a high-yielding method. The vehicles of study are correlations, scatter diagrams, and regressions. Some conditions that result in yields markedly above or below the quantities indicated by the annual precipitation are pointed out. A similarity in the lines showing the regression of yield on precipitation places all stations north of and including Archer, Wyoming, in a group desig-

nated "northern" that is distinct from all stations to the south of and including North Platte, Nebraska. For 272 station-years at northern stations the average (weighted) precipitation was 14.96 inches, the average (weighted) yield was 15.18 bushels, the coefficient of correlation was 0.74, and the regression equation was: Yield=(precipitation — 8.02) 2.19. A precipitation above or below the mean was accompanied by a yield in the same bracket in the ratio of 3.77 times to 1 when it was not. When the 272 pairs of variables are reduced to 30 pairs representing annual averages for each of the years 1906-1935 the coefficient of correlation is increased to 0.88. The regression equation is: Yield = (precipitation — 10.07) 3.19. The error of estimate of yield calculated by this equation averages 3.28 bushels or 20.5 percent of the mean yield, 16 bushels. The use of methods, such as continuous cropping to small grains, that leave the soil exhausted of available water at the beginning of the crop year, increases the dependence of the crop on the precipitation during the crop year, which is evidenced by higher coefficients of correlation. The use of methods, such as summer fallow, that store water in the soil before the beginning of the crop year reduces the dependence of the crop on the precipitation during the crop year and is evidenced by lower coefficients of correlation. The monthly precipitation at each station is given in appendix tables.—J. S. Cole.

2928. CONRAD, JOHN P., and C. N. ADAMS. Determining by plant response the retention of nutrient ions by soils. Jour. Amer. Soc. Agron. 31(1): 29-34. 1 fig. 1939.—
By allowing a soln. containing an essential element to drip upon a column of pots of dry soil responding to that element, the retention or non-retention of the element in question may be judged. After percolation has ceased, the column is taken down and the pots subsequently cropped to milo. In different tests the retention of ammonium and phosphate ions was shown by the markedly increased growth of the top pot of each column. The pots in the columns to which nitrates, nitrites, and sulfates were added showed non-retention by the rather uniformly enhanced growth in all pots of the respective columns. The method shows promise in research as well as in teaching.—J. P. Conrad.

2929. COOPER, J. F. Building Florida agriculture for fifty years. Contributions of the University of Florida agricultural experiment station related in connection with its Golden anniversary celebration, October 15th to November 15th, 1938. Citrus Indust. 19(11): 5, 20, 24-25, 1938.

2930. CULPEPPER, C. W., and H. H. MOON. Composition of the rhizome, stem, and leaf of some horticultural forms of canna in relation to their possible use. U.S. Dept. Agric. Circ. 497. 1-21. 1938.—The composition of the rhizome of Canna edulis grown near Washington, D. C., differed considerably from that reported by other workers with material grown in the tropics, the differences apparently being due to the shorter time during which the polysaccharides might accumulate in the rhizomes. The composition, however, varied greatly with the variety and the seasonal conditions. An abundant rainfall with good growing conditions during July and Aug. followed by moderate to low rainfall in Sept. and Oct. favored a high polysaccharide content in the case of most varieties or clones. Samples from different clones varied from 3.4 to 17.9% in their acid hydrolyzable polysaccharide content. The ornamental vars. were somewhat higher in their content of tannin, acidity, nitrate N, and fibers than the vars. of the edible group. The yields varied from 5.5 to 16 tons of rhizomes per acre in different clones, there being little relationship between composition and yield. The composition and yield indicate that the rhizomes might furnish an abundant supply of food materials, particularly carbo-hydrates. Cooking tests, however, showed that the materials darken considerably in the air in preparation for the table, are rather fibrous, and possess a flavor not particularly pleasing to most individuals. It resembles salsify somewhat and might be agreeable to those who like this vegetable.-

2931. DABRAL, B. M., and S. S. CHINEY. Microclimatology of an irrigated cotton field in Sind. *Indian Jour. Agric. Sci.* 8(2): 161-184. 1 pl., 1 fig. 1938.—Data on temps. and relative humidity recorded by an Assmann

psychrometer both inside and outside a cotton crop during the kharif season of 1935 at 3 typical heights above ground are given. During the earliest growth stages, irrigation somewhat reduces temps, and increases humidity over cropped bed. During the latter growth stages the differences between the two environments are great, especially during the day. Temps. highest at 6 inches above ground on a barren plot decrease with height up to 3-4 feet. This tendency is reversed under cropped conditions especially when plants have reached 3-4 feet and completely shade when plants have reached 3-4 teet and completely snade the soil. Soil temps, show wider differences. The uncropped open beds show temps, about 8°-10°C higher than the eropped ones for a few days after irrigation. The temps, run closer as the soil gets drier, in all phases of growth. The lowest soil temps, are reached just after a few days of irrigation. Instruments exposed at 4 feet height in the Stevenson Screen nearby do not show real conditions inside a crop. The dominating feature of the microclimate is the periodic fluctuation due to the intervals of irrigation. This rhythm is superimposed over the daily drift observed in ordinary air temps. The influence of crop growth lies in

creating shade conditions.—Auth. summ.

2932. DODD, D. R. Cooperative experiments in pasture improvement. Ohio State Bimonthly Bull. 191. 39-47. 3 fig. 1938.—Fertilizer and liming tests on pasture, made in 1931-1937, yielded much evidence to justify the general improvement of adapted permanent pasture lands. The use of lime and phosphate at regular intervals on permanent pastures evidently should become a regular farm practice. Where more pasture is needed than results from the use of lime and minerals, as may appear on intensive dairy farms, liberal use of N seemed warranted. A summary of production with equivalents in ewe and lamb grazing days, meat and milk, and returns per acre is tabulated, and the effect of white clover content on herbage, yield, and possible returns is discussed.—H. M. Steece (courtesy of Exp. Sta.

Rec.).

2933. EDMUNDSON, W. C. Time of irrigating potatoes as affecting stolon growth and tuber set and development. U. S. Dept. Agric. Circ. 496. 1-17. 8 fig. 1938.—Field exps. on the effect of early and late applications of the initial irrigation on stolon growth, tuber set and development were conducted over a 7-year period with Rural New Yorker No. 2 and Triumph. The early irrigated plots were watered when the plants required it throughout the growing season to maintain a continuous vigorous growth. The late irrigated plots did not receive the first irrigation until 2 or 3 weeks later. Early irrigation caused a slight lowering of the soil temp, during July and Aug. Early applications of water had no effect on the number of stolons produced per hill; however, such irrigation caused a much more rapid growth and development of stolons. In years of high soil temp. Triumph plants in the late irrigated plots developed long stolons with aerial stems. Plants which received early irrigation water produced an early set and a more rapid development of tubers. Early irrigation had little effect on the total number of tubers produced per hill, but produced a larger number of tubers weighing 85 g. or more.— W. C. Edmundson.

2934. FAES, H., et G. A. PIGUET. Etude sur la qualité

et la production de quelques cépages rouges. Landw. Jahrb. Schweiz 52(8): 897-912. 1938.
2935. FREISE, F. W. Zusammensetzung der Samen von Cajanus sp. und Canavalia sp., zwei brasilianischen Volksnahrungsmitteln. Zeitschr. Üntersuch. Lebensmittel 75(6): 566-568. 1938

2936. GODARD. La température du sol et le développement automnal de la betterave sucrière. Compt. Rend. Acad. Agric. France 24(9): 357-364. 1938.

2937. HABER, E. S. A study of drouth resistance in inbred strains of sweet corn Zea mays var. rugosa. Iowa Agric. Exp. Sta. Res. Bull. 243. 53-72. 1938.—Of the anatomical and physical properties studied—transpiration, number of stomata, root system and vascular bundles—the transpiration rate of inbred lines of sweet corn was higher in susceptible inbreds as a group than in resistant lines, under conditions of high temp, and low relative humidity. A satisfactory laboratory test for classifying the lines into resistant and susceptible classes consists of exposing 15-20day-old seedlings to high temp, and low humidity. Exposure at 55°C. for 5 hours caused the death of most of the susceptible seedlings. Some resistant plants of sweet corn survived exposure to 55°C for 6 hours.—E. S. Haber.

2938. HELLER, V. G. The chemical content of Oklahoma

rainfall. Oklahoma Agric. Exp. Sta. Tech. Bull. 1. 1-23. 1938.-N brought down by rainfall in the form of ammonia reached its maximum in the spring, was lower during the summer, and rose again in the early fall. Nitrate N increased after electrical disturbances, especially during Sept. The content of nitrite N was usually small. The Cl content appeared to be greater in the spring and fall, varying with the direction of the wind and the location. The sulfates were "surprisingly high" and varied greatly with the location and time of year. Samples collected at industrial centers were of uniformly higher sulfate, "suggesting contamination from fumes of burning oil, gas, or coal." The greater percentage of chemical content was found in the limited rainfall after prolonged dry periods, after dust storms, and near industrial centers.—H. C. Waterman (courtesy Exp. Sta. Rec.).

2939. HOLLOWELL, E. A. Crimson clover. U. S. Dept. Agric. Leaflet 160. 1-8. 6 fig. 1938.—Practices for growing crimson clover (Trifolium incarnatum) for pasturage, hay, green manure, and seed are outlined with information on

H. M. Steece (courtesy Exp. Sta. Rec.).

2940. KIRK, L. E. Trends in Canadian crop production with special reference to cereals. Chem. and Indust. [London] 57: 925-928. 2 fig. 1938.—A statistical discussion.— B. Tabenkin. 2941. KI

B. Tabenkin.
2941. KIRSTE, A. Zweckmässige Bodenbearbeitung, insbesondere die Untergrundlockerung, ist ein Mittel zu weitere Ertragssteigerung im Rübenbau Hannovers. Zuckerrübenbau 20(10): 150-157. 1938.
2942. KNOLLE, W. Moderne Rübenernteverfahren. Zuckerrübenbau 20(8): 113-120. 1938.
2943. KUHLMANN, A. G. Solvafzifa biokolloidov ozymykh i farovykh pshenifz. [Solvafzifa biokolloidov ozymykh i farovykh pshenifz. [Solvation of biocolloids of winter and spring wheat.] [In Russ. with Eng. summ.] Biokhimifa [Biochem.] 3(3): 289-294. 1938.—Total solvation of colloids in flour prepared from 6 yars. of wheat tion of colloids in flour prepared from 6 vars. of wheat was detd. by means of viscosity measurements. Solvation is greater in winter than in spring wheat, indicating a higher hydrophility of the former. Filtration expts. show a direct relation between total solvation and water-retaining capacity of the flour.—E. K. Johnson.

2944. LANCASTER, H. M. Malting quality of spring barleys, 1933-1936. Jour. Nation. Inst. Agric. Bot. 4(3):

287-292. 1938.

2945. LODGE, F. S. Potash in the fertilizer industry. Indust. and Engineer. Chem. 30(8): 878-882. 3 fig. 1938.— The U.S. is now completely independent of foreign supplies. -M. C. Moore.

2946. MAROTTA, DOMENICO. Frumento e mais nella panificazione. [Wheat and maize in bread making.] Ist. Sanità Pubblica Rendiconti 1(2): 351-368. 1938.

2947. MAROTTA, D., e A. CALO. Esperienze di macinazione e di panificazione con farine di mais. [Experience in the grinding of corn and making bread with corn meal.]

Ist. Sanità Pubblica Rendiconti 1(2): 388-408. 9 pl. 1938.

2948. MAROTTA, D., e A. CALO. Esperienze di maci-nazione e panificazione con farina di fava. [Experience in

the grinding of and making bread with beans.] Ist. Sanità
Pubblica [Rome], Rendiconti 1(2): 409-420. 9 pl. 1938.

2949. MIÈGE, E. Influence du froid artificiel sur la
conservation et la productivité des tubercules de pommes de terre au Maroc. Compt. Rend. Acad. Agric. France 24 (17): 565-575, 1938.

2950. MIEGE, E. L'amélioration du lin à graines au Maroc. Compt. Rend. Assoc. Franç. Avanc. Sci. 60: 355-

357. 1934(1937)

2951. MURPHY, R. P., and A. C. ARNY. The emergence of grass and legume seedlings planted at different depths in five soil types. Jour. Amer. Soc. Agron. 31(1): 17-28, 1939.—The rate and total emergence from 5 soil types were detd. for seedlings of some small-seeded legumes and grasses. In the field and greenhouse expts. the most satisfactory emergence for initial stands was found to be from the ½-inch depth of planting. Total emergence from the surface plantings was highest only under optimum environmental

conditions. The emergence for all crops studied was nearly complete 15 days after planting; however, the legumes reached their maximum emergence approx. 5 days before the grasses. The total emergence showed a significant positive correlation with seed size only from the 2- or 3-inch planting depths. The effects of soil type upon total emergence were found to be subordinate to the effects of depth of planting.—R. P. Murphy.

2952. ODLAND, T. E., and G. F. LEA. Preserving long-time experiments in cement frames. Jour. Amer. Soc.

Agron. 31(1): 77-79. 1 fig. 1939.
2953. PORTER, R. H. Experiments with modified techniques for the determination of purity and viability of bluegrass seed, Poa pratensis L. Iowa Agric. Exp. Sta. Res. Bull. 235. 89-111. 1 fig. 1938.—A close approximation of pure bluegrass seed could be obtained by modified procedure involving separation of unattached infertile florets or spikelets from fertile florets by a uniform speed motor and fan and a vertical air blast separator of the Holland type. Removal of pieces of stem, grit, stones, weeds, and other crop seeds from the heavy portion is the only hand labor involved. In general, the percentages of heavy and pure seed fractions fall within the range of natural variability, indicating that the uniform speed motor and fan provide a reasonably constant air pressure. Similar response by samples ranging from 16 to 27 lb. in bushel weight suggested weight per bushel for these samples was controlled more by amount of empty florets present than by immature or lightweight seed. Seed weighing 10 lb. required a stronger air blast to remove infertile florets than did heavier seed. Each of 8 seed laboratories using the modified method with a similar subsample previously blown to aid in calibration of each blower obtained purity per-centages within the range of natural variability. Difficulties involved in the application of the proposed method to seed laboratory practice and its advantages are discussed. Germination tests of nonfresh bluegrass seed indicated that sterile sand saturated with distilled water in Petri dishes is slightly superior as a substratum to filter paper moistened with distilled water or with 0.2% KNO2 solution. Copper trays equipped with wicks to maintain a constant supply of water are equal to sand according to limited tests. Total germination was significantly higher on sand than on filter papers at 10, 15, and 20 days after the tests began; mean germination at the end of 15 days on sand about equaled that on filter papers at the end of 28 days.—H. M. Steece (courtesy Exp. Sta. Rec.).

2954. ROEMER, T. Neue Methoden der Ansaat von Kleearten im Hauptund im Zwischenfruchtbau für Trocken-

gebiete. Zuckerrübenbau 20(8): 120-123. 1938.

2955. SCHRIBAUX, E. Deux nouvelles variétés de blé pour le Sud-Ouest. Compt. Rend. Acad. Agric. France 24 (9): 346-352. 1938.—Bladette du S.-O. and Bladette de la Garonne.

2956. SINGH, D. Cultivation of rice and berseem as a measure of improving bari soil (alkaline soil). Punjab Agric. Dept. Seasonal Notes 17(1): 11-14. 1938.

2957. SINGH, S. S. S. L., and L. N. RAM. Varietal tests of sugarcane at the Lyalipur agricultural farm, Lyalipur. Punjab Agric. Dept. Seasonal Notes 17(1): 20-23. 1938.

2958. SPRAGUE, G. F. An estimation of the number

of top-crossed plants required for adequate representation of a corn variety. Jour. Amer. Soc. Agron. 31(1): 11-16. 1939.—Top crossed ears of 2 vars., 40 ears of Reid and 120 ears of Krug, were compared for yield in separate expts. An estimate of the number of plants of the open pollinated vars. required for adequate representation was obtained from a comparison of the variance due to error and variance associated with 2 parentage. 10-20 ear samples were apparently adequate to represent each of the 2 vars.—G. F. Sprague.

2959. STRINGFIELD, G. H. Data and notes on certified corn hybrids for Ohio. Ohio State Bimonthly Bull. 191.

29-38. 1 fig. 1938.
2960. THOMPSON, E. G. Spring barley trials, 1933-1937. Jour. Nation. Inst. Agric. Bot. 4(3): 275-286. 1938.

2961. ANONYMOUS. Ensayos experimentales sobre trigo. [Exps. with wheat.] Bol. Chacra Exp. "La Prevision" 2(4): 159-175. 1937/1938.

2962. ANONYMOUS. Permanent pastures: A compila-

tion of experimental work with permanent pastures in the Southern Region and in North Carolina and Tennessee U. S. Dept. Agric., Agric. Adjust. Admin., South. Region Agr. Conserv. SRAC-5. v+64p. 1938.—Results obtained in all permanent pasture exps. reported to date by the exp. stations in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, and Texas are grouped as to value, establishment improvement, and management of pastures.—Courtesy Exp. Sta. Rec.

2963. ANONYMOUS. The classification of cotton. U. S. Dept. Agric. Misc. Publ. 310. 1-54. 20 fig. 1938.—This handbook deals in order with the nature of cotton and basis of its classification; sampling and the care and handling of samples; factors of, standards for, and the determination of grade; method of grading irregular and special-condition cotton; inaccuracies in grading cotton; factors of staple and the standards for staple; method of stapling and common errors in stapling; factors of character; effect, of moisture on staple and character; and the relation of classification to prices. Official notices establishing cotton standards for grade and length of staple are appended. H. M. Steece (courtesy Exp. Sta. Rec.).

SOIL SCIENCE (EDAPHOLOGY)

2964. BENSON, NELS, and R. M. BARNETTE. Leach-2904. BENSUN, NELS, and R. M. BARNETTE. Deathing studies with various sources of nitrogen. Jour. Amer. Soc. Agron. 31(1): 44-54. 1939.—Cultures of Norfolk sand in small lysimeters fertilized with NaNO₃, Ca(NO₃)₂, NH₄NO₃, NH₄H₂PO₄, NH₄HCO₅, (NH₄)₂SO₄, urea, fish meal, castor pomace and tankage, were allowed to stand 1, 4, 10 and 21 days before leaching with distilled water and comparing the composition of these leachates with those of untreated checks. All N applied as nitrate and \$\frac{1}{3}\$ of the ammonium N applied as (NH₄)₂SO₄ and NH₄NO₅ was leached. The leaching of the ammonium ion from NH₄H₂O₄ was low. Urea leached as urea to the extent of 35% and 16% after the 1- and 4-day periods respectively. Ammonium N was retained very efficiently by the soil treated with urea and NH₄HCO₃ until nitrification began. Cultures treated with the insoluble organics gave results very similar to the untreated cultures. Similar cultures of Norfolk sand, Bladen fine sand, Fellowship fine sandy loam and Norfolk fine sandy loam were treated with NaNOs, (NH.), SO, urea, castor pomace, and incubated 4 days before leaching for comparison with untreated checks. Nitrates leached almost completely except for Norfolk fine sandy loam which retained 27.8%. Norfolk sand allowed 40% of the ammonium N to leach from (NH₄)₂SO₄ treatment while insignificant amts. leached from the other soils. No urea was found in any of the leachates. The castor pomace treatment gave similar results to the untreated cultures. The leachates showed greater acidity than did the soils and the pH value of the soil was raised by leaching.—N. Benson.

De SIGMOND, A. A. J. The principles of soil Transl. by A. B. YOLLAND. Edited by G. V. 2965. science. JACKS. xiv+362p. 4 pl., 34 fig. Thomas Murby and Co.: London, 1938.—A foreword by E. J. (Sir John) Russell notes, in part, that "the main theme . . is the presenta-tion and discussion of the system of soil classification already known internationally by the author's name, but never before described in detail in an English publication. ... Every country possesses certain soil types not found elsewhere; certain English soils, for example, do not easily fit into Prof. de Sigmond's system, and certain Hungarian soils fit into no English system. The comprehensive classification here proposed, based essentially on the chemical composition of the soil, is not intended to be final, but it satisfactorily fills many gaps in other systems, and leads us a considerable step further toward the goal of every soil taxonomist—a universal classification based on strictly scientific principles." Following the foreword, author's preface, and an introduction concerned with "soil science and its field," the book is in 4 parts, of which the first, soil genetics, takes up geological and petrographic soil-forming factors, climatic soil-forming factors, orographical (local) and hydrographical conditions as soil-forming factors, natural vegetation as a soil-forming factor, animals as soilforming factors, micro-organisms as soil-forming factors, the age of soils—time as a soil-forming factor, man as a soil-forming factor, and the principal soil-forming reactions. Part 2, agronomy, considers local soil surveys and chemical properties of soils and their characterization. Part 3, soil systematics, includes the general soil system, characterization and further classification of soil types, and physical and physiological classification of local varieties. Part 4, principles of soil cartography, discusses various types of soil maps, laws governing the geographical distribution of soil types, and to what extent does the actual distribution of soil types agree with the general soil system. The book has both subject index and author index.—Courtesy Exp. Sta. Rec.

2966. GIESEKING, J. E. The mechanism of cation exchange in the montmorillonite-beidellite-nontronite type

of clay minerals. Soil Sci. 47(1): 1-12. 1 pl. 1938. 2967. KELLEY, W. P., and S. M. BROWN. An unusual alkali soil. Jour. Amer. Soc. Agron. 31(1): 41-43. 1939 .-The virgin black alkali soil, adjacent to the area on which the Oregon Agric. Exp. Station has conducted alkali reclamation exps. for many years, contains unusual amounts of soluble Na silicate, in addition to Na₂CO₃. This soil is also peculiar in that a water extract of it contains very little NaHCO₂. A thorough study of the geological and pedological history of this soil should be made.—W. P.

KUBIENA, WALTER L. Micropedology. xvi+ 2968. 243p. Illus. Collegiate Press, Inc.: Ames, Iowa, 1938. Pr. \$3.—This book represents the lectures the author gave as guest Professor of Soil Morphology at the Iowa State College during the year 1937 and is the result of his 9 years' experience in the adaptation of the microscope to soil investigations. The book assumes a knowledge of general soils, soil microbiology, and microscopy and is devoted to the fundamental principles of microscopic pedology. The material is presented in 4 parts. Part I presents the principles of micropedology, uses and development of micro-technic in other natural sciences. Part II treats of the technic of micropedology with chapters on incident light microscopes, the soil microscope, performance of micromanipulations, microscopic field investigations, soil sampling, soil prepns., fabric reactions, optical methods, and microchemical methods. The detailed procedures for micro-manipulations are well illustrated by excellent drawings and photographs. Part III develops the principles of soil fabrics or the arrangement of the constituents of a soil in relation to each other. Part IV deals with biological soil microscopy by which is understood a study of living things in the soil and their activity in the microscopic dimensions as perceived by direct observation. The author has introduced a new concept in soil fabrics which is most interesting and promises to be of large value in the study of the genetic relationships of soils.—F. B. S. (courtesy Jour. Amer. Soc. Agron.).

2969. McGEORGE, W. T., and J. F. BREAZEALE. Studies on soil structure: Effect of puddled soils on plant growth. Arizona Agric. Exp. Sta. Tech. Bull. 72. 411-447. 212 fig. 1938.—Soil structure may be seriously injured by vibration produced by heavy farm implements but a puddled soil can be restored to productivity by a dry fallow or improved by a dust mulch to the extent to which plant growth is increased. Seeds will not germinate in puddled soil unless near a graph or other accusted guidest. puddled soil unless near a crack or other aerated surface. One principal effect of puddling is the reduced availability of soil moisture, which is much lower than in waterlogged soils. In puddled soils, decomposed organic matter produces a toxicity which may seriously reduce productivity and may persist even after a dry fallow. Puddling materially reduces the availability of added as well as native P, K, Ca,

and N.-H. C. Waterman (courtesy Exp. Sta. Rec.).
2970. METZGER, W. H. The nature, extent, and distribution of fertilizer residues in the soil of some old fertility

plats. Soil Sci. 47(1): 15-26, 1938

2971. PASCHALL, A. H., J. G. STEELE, F. G. LOUGHRY, and G. W. CONREY. Soil survey of Athens County, Ohio. U. S. Dept. Agric. Bur. Chem. and Soils 1932(32): 1-39. Map, 1 fig. 1939.

2972. PERKINS, S. O., M. W. BECK, E. F. GOLDSTON, J. A. SUTTON, and WILLIAM GETTYS. Soil survey of Construct County. North Coroling. IJ. S. Dept. Agric. Rev.

Carteret County, North Carolina. U. S. Dept. Agric. Bur. Chem. and Soils 1930(3): 1-34. Map, 1 fig. 1938.

2973. PURI, AMAR NATH, and B. R. PURI. Physical characteristics of soils. II. Expressing mechanical analysis and state of aggregation of soils by single values. Soil Sci. 47(1): 77-81. 1938.

2974. SMITH, LESLIE H., M. H. LAYTON, E. H. TEMPLIN, A. H. BEAN, and J. W. HUCKABEE, Jr. Soil survey of Williamson County, Texas. U. S. Dept. Agric. Bur. Chem. and Soils 1934(10): 1-55. Map, 2 fig. 1939. 2975. STEVENS, KENNETH R. Chemical nature of

organic matter in differently cropped arid soils. Soil Sci. 47(1): 27-31. 1939.—The method of proximate analysis of soil organic matter was applied to an arid soil under irrigation. Samples were taken from adjacent plats which had supported continuous fallow, oats, and alfalfa, respectively, for 25 years. These soils were somewhat high in the ether- and alcohol-soluble fraction. The "protein" and "lignin-humus" fractions were high. The carbohydrate fraction was unusually low. The ether- and alcohol-soluble and carbohydrate fractions decreased with depth for the 3 plats. The "protein" fraction decreased with depth for the fallow and oats plats but increased with depth for the alfalfa plat. The "lignin-humus" fraction increased with depth in the fallow plat but decreased with depth in the oats and alfalfa plats.-K. R. Stevens.

2976. WATKINS, W. I., W. H. METZGER, and J. R. LATTA. Soil survey of Allen County, Kansas. U. S. Dept. Agric. Bur. Chem. and Soils 1935(2): 1-42. Map, 1 pl., 3 fig.

HORTICULTURE

F. C. BRADFORD, Editor

(See also in this issue Entries 1699, 1741, 1742, 1745, 1747, 1750, 1753, 1877, 2079, 2722, 2726, 2851, 2877, 2929, 2930, 3063, 3082, 3097, 3146, 3147, 3166, 3216)

2977. BALLOU, F. H. Some less well-known rock plants in Ohio. Ohio State Bimonthly Bull. 191. 67. 1938.—A list is presented with height data of rock and alpine plants not commonly grown or known to the average Ohio nurseryman

but considered of value for rock garden planting.—J. W. Wellington (courtesy of Exp. Sta. Rec.).

2978. BEAUMONT, J. H. The evaluation of certain nut characters used in selecting varieties of macadamia.

Proc. Amer. Soc. Hort. Sci. 35: 235-237. 1937(1938).—Studies to determine the value of nut characters—diam. of nut, weight of kernel, and thickness of shell at the side and at the base—in selecting *Macadamia* vars. were made on random samples, selected tree samples, and selected tree and nut samples. No significant differences were found among the samples for any given measurement. However, with few exceptions the regression coefficients of the possible

combinations of variates were significant, and verified a direct relationship between the variates compared.—K. W.

2979. BLAIR, D. S. Rootstock and scion relationship in apple trees. Sci. Agric. [Ottawa] 19(2): 85-94. 1938.— This investigation covers trees which have a clonal intermediate stem-piece 9 inches long of either M. IX, II, or XIII mediate stem-piece 9 inches long of either M. IX, II, or XIII inserted between an absorbing root system (Seedling French Crab), and the scion var. Bramley Seedling. Trees with intermediates of M. IX differ in almost every respect from the trees with intermediates of M. II or M. XIII. The trees with intermediates of M. II and M. XIII are almost identical in size and weight, but exhibit "qualitative" differences which distinguish them. The 3 stem-pieces exhibit marked differences in radial development and these characteristics distinguish the groups. Equal radial development of the

scion and the intermediate is not essential to the free development of the tree as a whole. The effect of the intermediate upon root development is even greater than it is upon the above-ground parts. The intermediates profoundly affected the physiological relationship between root and shoot systems. The possibility that the stem root ratio of a tree may be stabilized at different levels through the influence of rootstock or intermediate has both practical and theoretical importance. The use of intermediates produced effects that are non-measurable, such as leaf poise, general habit of branching, coloration of the leaves par-ticularly just prior to leaf fall and time of defoliation. In some cases it may be "The nature of the union" as in the case of M. IX, which gives the characteristic effect, but from a fundamental standpoint the nature of the union depends on the co-ordination of several functions of the stem tissues and also on the sheer mechanical problem of obtaining xylem and phloem continuity in tissues which may or may not have the same cell size. Normal periodicity in tissue development and the whole problem of translocation are involved. The effects of the rootstock on growth and precocity of a scion can, with the 3 rootstocks M. IX, M. II and M. XIII, be produced without the aid of their respective rootsystems by inserting stem-pieces of these vars, between an absorbing rootsystem of accepted vigor and the scion variety. The effect may not be confined to stem-pieces, but can be produced by them. -D. S. Blair.

2980. BONDAR, G. El cultivo del cacao. Union Panamer. Ser. Agric. 129. 1-16. Illus. 1938.
2981. BROEKHUIZEN, S. Ziekten en plagen van de

champignoncultuur. [Diseases and pests of mushroom culture.] [With English summ.] Tijdschr. Plantenziekten 44 (3): 113-140. 7 pl. 1938.—A review is given of the diseases and pests known in mushroom growing. Their occurrence in Holland is recorded. Many diseases are as yet unknown in that country. Control measures are described in detail.-H. L. G. de Bruyn.

2982. CALTHORPE, D. Rust-proof Antirrhinums. Gard. Chron. [London] 104(2702): 266. 1938.

2983. COMIN, DONALD. Early yields of selected truck crops as affected by fertilizer treatments. Proc. Amer. Soc. Hort. Sci. 35: 673-677. 1937(1938).—Results of manure and fertilizer applications on selected plots in a 4-year rotation of tomatoes, cabbage, cucumbers, and sweet corn grown on a Chenango fine sandy loam, reveal that the effect of N, P and K, singly or combined, was more pronounced as the season advanced. Tomatoes and sweet corn responded most to P and cucumbers and cabbage to N in greater early yields. Small applications of K (ca. 50 lbs. per acre) did not significantly increase the early yield of these crops although the effect of this element increased as the rotations advanced. Lime had no significant effect when applied on this soil with an initial reaction of pH 5.5. 16 tons of manure had about the same effect on early yields of tomatoes as 610 lbs. of a 4-10-4 fertilizer; 1220 pounds of the same mixture was slightly superior. The early cabbage yields were distinctly depressed where manure was used; cucumbers responded better to manure than to the heaviest fertilizer treatment. Sweet corn responded to N in any form but showed little response to the other 2 elements. Small increases in yield were highly significant in the light of the rapid drop in growers' selling price as the season advanced. -D. Comin.

2984. COOMBES, A. N. A manurial trial with pineapples. Mauritius Dept. Agric. Leaflet Ser. 42. 1-6. 1938.

2985. CRESWELL, L. Origin of the Boysenberry. Horti-

culture 16(21): 424. Illus. 1938.

2986. DAVIDSON, O. W., and M. A. BLAKE. Nutrient deficiency and nutrient balance with the peach. Proc. Amer. Soc. Hort. Sci. 35: 339-346. 3 fig. 1937(1938).—In 1-year-old Eclipse trees growing in sand cultures and receiving 2 p.p.m. Ca and 10 p.p.m. Ca an increase in the K conc. from 140 to 590 p.p.m. resulted in more marked Ca deficiency symptoms and a marked decrease in soluble Ca in the tips. Trees receiving 10 p.p.m. Ca plus 140 p.p.m. K were comparable in nearly all respects to those grown in the complete treatment (180 p.p.m. Ca, 140 p.p.m. K). In 2 p.p.m. K and 10 p.p.m. K treatments an increase in the Ca conc. from 180 to 410 p.p.m. resulted in marked K

deficiency symptoms and a reduction in the soluble K content of the tips. Ten p.p.m. K plus 180 p.p.m. Ca resulted in no external symptoms of K deficiency, but about 25% less growth than in the complete treatment.—R. V. Lott.

2987. FILEWICZ, WLADISLAW. Nowe metody w sadach i szkolkach. Leezenie i wzmacnianie jabloni. Sadach 1 SZKOIKach. Leczenie 1 wzmachianie japowa-ie [Bridge-grafting and invigorating apple trees.] [In Polish with Eng. summ.] Roczniki Nauk Ogrodniczych (Ann. Sci. Hort.) [Warsaw] 5: 35-139. 1938.—The author describes the usefulness of bridge grafting and inarching in restoring winter-injured apple trees, as exemplified in several orchards at Sosnowe. In a 21-year old block of untreated Winter Gold Pearmain 43% are dead and only 12% are vigorous; in another block of the same var. and same age, but treated, 24% are dead and 64% vigorous. Other cases are cited. It is claimed that a tender top is made more hardy if a few grafts of a hardy var. are grown in it. In recent plantings the need of treatment has been obviated by grafting the tender vars on hardy trunks (Antonovka) and permitting a few branches of the hardy var. to grow.—From author's summary

2988. GOURLEY, J. H. Meristems and fruit bud formation in relation to general horticultural practice. Bot. Gaz. 99(4): 845-853. 1938.—Two factors are emphasized as influencing the formation of flower buds on fruit trees, (1) the need for an abundance of "healthy" green leaves; and (2) a slowing or checking of growth just prior to flower bud differentiation.—J. H. Gourley.

2989. GRAHAM, S. H. The possibilities of a real variety of English walnut for the North in the Crath importation from the Carpathians. Proc. Pennsylvania Nut Grow. Assoc. 6: 5-9, 1938

2990. HAWTHORN, LESLIE R. Some ecological factors affecting vegetable varieties in Southwest Texas. Proc. Amer. Soc. Hort. Sci. 35: 690-692. 1937(1938).—Growers participating in the recent expansion of the vegetable industry in Southwest Texas have had to depend largely on vegetable varieties developed elsewhere under very different climatic conditions. Factors such as photoperiod, temp., relative humidity, early and late killing freezes, etc., are all discussed briefly in relation to certain vegetables taken as examples, and in the light of the author's work as well as that of others. Since the combination of factors involved in SW Texas is rarely the same as in some older vegetable sections, some crops (and in some important instances certain vars.) unexpectedly respond either very favorably or unfavorably.—L. R. Hawthorn.

2991. HEWETSON, F. N. The potash situation in Michigan orchard soils. Quart. Bull. Michigan Agric. Exp. Sta. 21(2): 113-123. 1938.—This investigation consisted of field and pot exps. in addition to a survey of orchard soils in Michigan. In the field and pot exps., K₂O was applied to the soil in combination with (NH₄)₂SO₄, NaNO₄, Cyanamid or superphosphate. The trees consisted of apple, cherry, peach, pear and plum, while the soils ranged from a sandy to a loam soil. It was concluded that K is not the limiting factor in fruit production in Michigan, has no beneficial effect on tree growth and does not alleviate the foliage burning induced by late spring applications of Cyanamid.—F. N. Hewetson.

2992. HOFFMAN, I. C. The role of minor elements in greenhouse vegetable production. Proc. Amer. Soc. Hort. Sci. 35: 514-517. 1937(1938).—Mineral deficiencies that may appear under greenhouse conditions due to soil depletion are briefly discussed. Deficiencies due to Mn, Mg, Ca and Fe have occurred and the methods employed to overcome these are given.—R. A. Steinberg.

2993. HOWLETT, F. S., and T. F. FOWLER. Early fruit thinning in relation to annual bearing. Ohio State Bimonthly Bull. 192, 99-110. 1938.—The fruits of halves of the same trees of Delicious, Northern Spy, Oldenburg, and Stayman Winesap were thinned 3 weeks after petal fall and from 6 to 7 weeks after petal fall to determine the effects of such thinning on the promotion of annual bearing. In all cases the early thinning resulted in the production of sufficient flowers the subsequent year to yield a commercial crop. The later thinning was associated with a very marked reduction in fruiting the following year. The authors point out the commercial limitations to early thinning and present practical suggestions for growers.—J. W. Wellington

(courtesy Exp. Sta. Rec.).
2994. KARMANN, W. Beobachtungen über das "Frei-machen" des Edelteiles der Obsthaume durch nachtragliche Wurzelbildung oberhalb der Unterlage. Obst- u. Gemüsebau 84(11): 147. 1938.—Striking lack of uniformity in a planting of apples and pears was found to be due not only to differences in stocks but also to differences in formation of scion roots. Several types of quince roots used as pear stocks seemed to influence scion root formation variously. In many cases formation of roots above the graft union has resulted in more vigorous growth and diminished fruitfulness. In pear vars. such as Pastorenbirne [Curé, Vicar of Winkfield] and Amanlis, formation of a single very large scion root is more striking than in vars. such as Beurré Diel and Lebrun. Own-rooted trees receiving the close pruning customary with dwarf trees remain unfruitful, while those receiving lighter pruning have borne fruit. In a row of Winkfield pears trained in 8-arm palmette on quince, scion root formation was heavier in the trees whose graft union was only slightly in contact with soil than in those whose graft union was deeper; the former were more vigorous and longer-lived, the latter more fruitful. In a subsoil that was dry and heavy in lime, 40-yr. old pear trees on seedling roots had formed an extensive horizontal scion root system above a relatively limited system of seedling roots.—F. C. Bradford.

2995. KOCH, H. R. Der "tausendjährige Drachenbaum"—das Wahrzeichen der Kanarischen Inseln. Naturforscher 15

(3): 88-92. Illus. 1938

2996. KOSTER, P. M. Color. An effort to bring correctness into the use of color terms. Florida Exchange 91(6):

2997. MARTIN, JOHN N. Cytological and morphological features associated with impotency of pollen of the Winesap apple. Iowa State Coll. Jour. of Sci. 12(3): 397-404. 1 pl. 1938.—An excessive development of tapetal and wall tissue in association with the abortion of pollen in the Winesap is described. The tapetal cells apparently prey upon the developing pollen, destroying much and in some anthers almost all of the pollen. Chromosome counts verified Nebel's claim that the Winesap is a diploid, having 34 chromosomes. The reversal in the physiological relationship of tapetal tissue and pollen is not explicable on the basis of meiotic irregularities for none were observed, but may depend upon the influence of genes and its heredity be associated with a composite chromosome nature of diploid apples, which according to Darlington and Moffett are allotetraploids and supposedly the result of interspecific crossing.—J. N. Martin. crossing.

2998. MAYNE, W. W. Annual report of the coffee scientific officer, 1937-38. Mysore Coffee Exp. Sta. Bull. 17. 1-17. 1938.

2999. MURRAY, R. K. S., and C. A. de SILVA. Field experiments on Dartonfield estate. VI. Manuring experiment with mature rubber. Rubber Res. Scheme Ceylon

Quart. Circ. 15(1): 1-8. 1938.

3000. PIGORINI, L. Il gelso in Italia. [The mulberry tree in Italy.] Ann. R. Staz. Bacol. Sper. Padova 49: 353-415. 41 fig. 1937(1938).—A monograph upon the cultivation of the mulberry tree, its distribution, physiology and utilization (for the feeding of silk worms, of animals, conservation of the leaves in silos, etc.).—M. Tirelli (tr. by A. P. Hitchens).

3001. RANDALL, C. E., and D. P. EDGERTON. Famous trees. U. S. Dept. Agric. Misc. Publ. 295. 1-116. 51 fig. 1938.—This pamphlet is devoted to historical, descriptive, and other pertinent comments on trees associated with notable persons, events, and places.—J. W. Wellington (countesy Exp. Sta. Rec.).

3002. REED, C. A. Brazil, cashew and macadamia nuts. Proc. Pennsylvania Nut Grow. Assoc. 6: 35-41. 1938.

3003. SHEPARD, P. H. The relation of flower cluster thinning and light pruning to yields of American grapes. Proc. Amer. Pomol. Soc. 53: 59-62. 1937.—Concord, August Giant, Lindley, Eaton, and Merrimac vines pruned to 40, 60, 80, and 100 buds yielded the most fruit with the maximum number of buds, only 1 cluster being left per shoot. In Concord, Lindley, and Eaton the average weight of clusters was reduced somewhat on the 100-bud vines, but not to a serious degree. In August Giant the clusters were of the same weight and in Merimac the 100-bud group produced slightly larger clusters. Flower cluster thinning apparently offsets the depressing effect of overproduction and also the need of determining for each var., the optimum number of

buds.-Courtesy Exp. Sta. Rec.

3004. SKINNER, J. J., E. D. FOWLER, and A. O. ALBEN. Pecan soils of the Gulf and southeastern states and maintenance of their fertility. U. S. Dept. Agric. Circ. 492, 1-24, 2 maps, 1938.—Soils utilized for pecan growing in the South and depuiled and property. in the South are described and mapped. Pecans are growing in the South are described and mapped. Pecans are groups of soils, upland soils and Valley Land or stream bottom soils. 99% of native pecans are on stream bottom soils. 90% of improved vars. are on upland stream bottom soils. 90% of improved vars, are on upland soils. Pecans are found growing in 31 upland soil series and 24 Valley Land soil series. 95% of pecans on upland soils are on 7 soil series, Ruston, Norfolk, Tifton, Orangeburg, Greenville, Red Bay and Cecil, and these have many common characteristics. 80% of the native pecans are on 9 soil series, Miller, Yahola, Sharkey, Sarpy, Trinity, Pledger, Catalpa, Cahaba, and Kalmia. Cultural and fertilizer exps. on soil groups are reported. The upland soils in general respond to fertilizer treatment and their use results in respond to fertilizer treatment and their use results in larger yields and more vigorous trees. Fertilizers giving best results vary with soil type. Some respond only to N, others to N and K. Most soils require a complete fertilizer for best results. Fertilizer recommendations and analyses, and fertilizer composition are suggested. Winter green manure crops followed by cultivation in spring and early summer and a late summer gren manure crop maintain soil fertility factors better than other practices.-J. J. Skinner.

3005. TUKEY, H. B. "Incubator" fruit trees mark an advance in breeding. Farm Res. 4(4): 1, 7. 3 fig. 1938.—A popular description of a new technic in which the embryo is removed from the mother fruit during the growing season and grown aseptically on a nutrient agar.—Courtesy Exp. Sta. Rec.

3006. VAILE, J. E. The influence of rootstocks on the yield and vigor of American grapes. Proc. Amer. Soc. Hort. Sci. 35: 471-474. 1937(1938).—The vars. Concord, Moore Early, and Campbell Early were grafted on Cynthiana, Wine King, Xlanta, Champion, St. George, and the hybrid stocks A × RG—1, 1202, 1203, 41-B, 3306, and 3304. Yield, number of clusters per vine, and the weight of 1-year-old prunings from most combinations were obtained for 6 years. All stocks except Xlanta produced heavier yields and more vigorous vines, where measured, than the own-rooted vines. The behavior of Campbell Early was most influenced by the rootstocks with Moore Early second and Concord third. Cynthiana gave the greatest increases in yield and number of clusters while Wine King was first in vine vigor and cluster size.—H. E. Jacob.

3007. VERNER, LEIF. Histology of apple fruit tissue in relation to cracking. *Jour. Agric. Res.* 57(11): 813-824. 6 pl. 1938.—An histological study was made of the peripheral fruit tissues of Stayman Winesap apple, a var. highly susceptible to cracking, and of several vars. normally free of this injury. The susceptibility of Stayman Winesap apples to cracking is apparently due chiefly to premature essential or rectriction or rectriction or rectriction. cessation or restriction of growth in the hypodermal layer. Upon unusual acceleration of growth in the fruit cortex the limit of extensibility of the hypodermal layer of a susceptible specimen soon is reached and further expansion of the tissues beneath leads to cracking. This premature retardation of growth in the hypodermal layer seems to be related to exposure of the fruit to sun and general air movement; it is greatly accentuated in tissue so exposed and is virtually absent in tissues of densely shaded fruits.—L. Verner.

3008. WALLACE, T. A field experiment on the manuring of black currants. Jour. Pomol. and Hort. Sci. 16(2): 127-147. 1938.—Black currents grown on a low well-drained area previously in grass were treated as follows: A-no manure; B—farmyard manure, 10 tons annually; C—complete fertilizer of: NaNO₃, 4 cwt.; K₂SO₄, 3 cwt.; superphosphate, 3 cwt.; D—as C omitting K₂SO₄. The farmyard manure plots were outstanding for vigor and growth. The NPK plots had vigorous growth, but not equal to the manure plot. The plots omitting N and omitting P were nearly as vigorous as the NPK plot, but were behind near the end of the expt. Shoot growth was restricted and leaf scorch much more severe on check and minus K plots. Intensity of leaf spot (Pseudopeziza rilus) was increased by K₂O and lessened by N and P. Complete artificials and farmyard manure only increased yields notice-

ably.-E. L. Overholser.

3009. WARDLAW, C. W. Tropical fruits and vegetables: an account of their storage and transport. (Low Temperature Research Station, Mem. VII.) xii+224p. Imperial College of Tropical Agriculture: Trinidad, B.W.I., 1937. Pr. 4s.—This bulletin comprises articles, originally published in Tropical Agriculture vol. 14, 1937, dealing with the storage and transport of some 74 fruits and vegetables indigenous to, or capable of being grown in, the tropics. Attention is chiefly restricted to the major practical issues. The arrangement is alphabetical under the common names of the plants, and to each is appended a good bibliography. A rather unexpected thing is the number of plants included which are usually regarded as being crops of temperate or warm temperate lands: beans and peas, beet, various common Brassicas, carrot, celery, filbert, lettuce, radish. spinach, water-cress. Tropical crops receive the greatest consideration, special attention being given to avocado, banana, Citrus, mango, onion, papaw, persimmon, pineapple, potato, sweet potato, tomato. The tomato may be taken as an example of the author's treatment: the fruit is discussed in 26p. under the following heads: Introductory; General considerations; Chemical changes during development and ripening; Pre-storage factors and quality (color development, effects of fertilizers and soil moisture, temp. of growth, late harvesting, disease incidence); Harvesting maturity; Debuttoning; Packing-shed treatments (disinfectant treatment, standardization of packing maturity, culling and grading for size and color, wrapping and packing; Transport by rail; Rapid cooling; Interruption of cold storage; Storage and ripening temps. (storage at low and higher temps., experience in various countries, storage and nigher temps, experience in various countries, storage of tropically grown fruit); Low temp, injury (symptoms of chilling); Loss in weight; Effect of light on ripening; SO₂ injury; Ethylene ripening; Gas storage; 64 references. Much of the literature on this subject is scattered in journals which, often, are not easily available and this bulletin is, therefore, useful.—W. B. Brierley (courtesy Ann. Appl. Biol.).

3010. WEST, E. S., and A. HOWARD. Some effects of green manuring on citrus trees and on the soil. Australia Counc. Sci. and Indust. Res. Bull. 120. 1-36. 4 pl. 1938.—This Bulletin reports the results of a green manure exp. over a period of 13 years with citrus trees at Griffith, New S. The growth of a winter green manure crop (tick beans) increased the growth and yield of trees compared with trees kept clean-cultivated. The growth of a summer green manure crop (cowpeas) at first decreased the growth and yield of the trees owing to the competition of the cowpeas for soil moisture during the summer. After about 10 years the trees on the cowpeas plots caught up to those on the clean-cultivated plots. The better growth of the trees in the cowpeas plots compared with those of the clean-cultivated plots, in later years, is due to the decline in fertility and loss of structure of the soil of the cleancultivated plots, combined with the fact that the cowpeas offer less competition to mature trees than to young trees. The growth of alfalfa offers very strong competition to trees, and reduces the growth and yield of trees. A marked seasonal cycle of soil nitrate conc. occurs on both the tick bean plots and clean-cultivated plots, the seasonal cycle being significant to 120 cm. deep in the tick bean plots but disappearing after 60 cm. in the clean-cultivated plots. Rains and irrigation cause minor fluctuations in conc. of soil nitrate. The tick bean plots contain a higher annual mean nitrate content in the surface soil than the cleancultivated plots; the reverse is true at the lower depths. Throughout the whole profile to 120 cm. depth, the clean-cultivated plots have the highest nitrate content. When tick beans are ploughed in before Sept., little decomposition takes place and nitrates do not increase until the beginning of Sept. Early Sept. seems the best time to plough under

the tick beans. The presence or absence of the citrus tree has little effect on the seasonal soil nitrate conc. cycle When tick beans are ploughed under, there is a rapid formation of ammonia in the surface mulch, and this persist throughout the early summer. On the irrigated soils of the Murrumbidgee Irrigation Areas, concs. of nitrates of the order of 10 to 20 p.p.m. are commonly found down to 100 cm. or more. During growth, the green manure depresses the water table. The increase in the water-holding capacity of the soil after several years' green manuring is statistically significant but practically unimportant. The green manure has, however, a marked effect in preventing or reducing the loss of structure of the soil that is noted in the cleancultivated plots. The relation of green manuring to the soil fertility is discussed.—Auth. summ.

3011. WILSON, ALBERT. The California nutmeg tree in cultivation. Madroño 4(5): 166-167. 1 fig. 1938.—Torreya californica is an excellent subject for garden culture. Outstanding is a 60 to 70 year old specimen in Palo Alto with a height of 40 feet and a branch spread of 50 feet. Measurements and locations of 3 additional large specimen trees of this species are mentioned—E. Crum.

3012. WILSON, A. L., and A. L. STARK. The fruit tree situation in Utah. Utah Agric Exp. Sta. Bull. 279, 1-30, 12 fig. 1938.—Deductions from a survey of the 10 leading fruit-growing counties of the State: in most counties the production of peaches, cherries, and apricots is increasing, that of plums, prunes and apples decreasing; $\frac{1}{2}$ of the apples, $\frac{1}{3}$ of the sweet cherries, $\frac{1}{10}$ of the apricots, $\frac{1}{4}$ of the pears, $\frac{1}{10}$ of the sour cherries, and $\frac{1}{2}$ of the plums and prunes are unproductive and unprofitable—a total of about s of the fruit-tree population in the 10 counties; with 43.3% of the fruit trees in the entire 10 counties, Utah County is by far the most important.—J. W. Wellington (courtesy

Exp. Sta. Rec.).

3013. WINKLER, A. J. The effect of climatic regions. Wine Rev. 6(6): 14-16; 32. 1938.—Within the geographical zones where the grapes of the world are grown wide differences in environal conditions occur among the regions. Differences in soil type, humidity, etc., occur, but the best understood and most important factor is temp. The longtime experience in Europe has shown the effects of climate to be largely through its influence on the rate of changes in the constituents during development and on the composition of the grapes at maturity. Cool conditions, with these changes proceeding slowly, have been found most favorable for producing quality dry wines. The very hot regions, unsuited to dry wine production, are ideally fitted for fortified wines. Thus, when accompanied by proper methods of vinification and aging, the regional conditions determine the type of wine to be made, while the varietermines the quality within the type. Records indicate that California has almost as wide a spread in climatic conditions as occurs in all of Europe. These comparative figures (tabulated) give a general indication of the possibilities of the State for production of a variety of wine types. The importance to the State of adapting grape vars. and wine types to regional climatic conditions, rather than trying to produce everything everywhere, is stressed.—F. V. Rand (courtesy of Exp. Sta. Rec.).

3014. WROBLEWSKI, A. Program badan nad podkład-kami wegetatywnymi drzew owocowych w Ogrodach Kornickich. (Program of investigations of clonal stocks for fruits at the Kornickich Gardens.) [Polish with Ger. summ.] Roczniki Nauk Ogrodniczych (Annales Sci. Hort.) [Warsawl 5: 177-191, 1938.—This is a progress report on studies designed to discover vigorous and cold-resistant interstocks for apples, plums, pears, and sweet cherries. The survivors of the winter 1936-37, when quince types A and C (Malling) froze 100%, Prunus cerasifera divaricata 85%, Malus sylvestris seedlings 64%, P. domestica 45%, Pyrus communis 20%, furnished the starting point for studies of vigor, disease-resistance and free formation of adventive roots or shoots, and free acceptance of buds. Despite the general unsuitability of Malus baccata stocks, due to defective unions and weak growth induced in most scion vars., 51 seedlings were promising enough to warrant further study. Out of 10,000 sdlgs. of M. sylvestris, 87 cold-resistant and

free-rooting sdlgs. were selected. Of M. prunifolia, which in pure stands is comparatively uniform and cold-resistant, 49 free-rooting sdlgs. were saved for further study. *Prunus* insititia is cold-resistant but receives buds poorly and has in recent years been supplanted in common use by *P. cerasifera* and *P. c. divaricata*. Selection of plum stocks in this study has been confined to divaricata. *Pyrus ovoidea* Rehd. and P. serotina Rehd. from the mountains of Korea were

particularly cold-resistant; P. serrulata, calleryana, Brett-schneideri, betulaefolia and ussuriensis suffered severely. Present cherry selections are confined to mahaleb. Of the Malling apple stocks, Types I, II, and IX froze but slightly; XIII and XVI were undamaged.—Transl. from auth. summ.

3015. [ANONYMOUS]. "Redcap," a new early tomato. Farm Res. [New York State Sta.] 4(2): 7. 1938.

FORESTRY

W. N. SPARHAWK, Editor

(See also the section "Economic Entomology-Forest and Shade Trees"; and Entries 1688, 1758, 2889, 2904, 2917, 3086, 3164, 3193, 3197)

3016. BEVERSLUIS, J. R. Boschbouwkundige gegevens omtrent houtsoorten. [Silvicultural data on tree species.] Nederland. Boschbouw-Tijdschr. 11(12): 528-534. 1938.— The silvical characteristics of Abies alba are descr., with information on methods of establishment and management,

and on yields.—W. N. Sparhawk.

3017. CANSDALE, G. S., et al. The black poplars and their hybrids cultivated in Britain. 52p. 1 fig. Imperial Forestry Institute: University of Oxford, 1938. Pr. 3s.6d.— Correct nomenclature of the numerous hybrid poplars now in cultivation is important because of the wide differences among the various forms in rapidity and habit of growth and in disease resistance. This paper gives the results of a critical investigation of the spp., vars., and hybrids of black poplars. Significant minute vegetative characters are descr. and a key is given for all the forms commonly occurring in Great Britain. The vars and hybrids of black poplars and hybrids between black and balsam poplars are descr. and hybrids between black and balsam poplars are descr. in detail, including: P. nigra, P. n. v. typica, P. n. v. italica, P. n. v. betulifolia, P. n. v. plantierensis, X P. charkowiensis, P. deltoides v. monolifera, P. d. v. missouriensis, P. angulata, X P. serotina, X P. serotina v. erecta, X P. serotina v. aurea, X P. regenerata, X P. eugenei, X P. marilandica, X P. robusta, X P. lloydii, X P. generosa, and X P. berolinensis. W. N. Sparhawk.

3018. DANNECKER, K. Gedanken über Vorratswirtschaft im Fichtenwald. Allg. Forst- u. Jagd-Ztg. 114(11): 351-358.

1938.—The advantages of growing-stock management, with emphasis on the individual trees and the improvement of the growing stock, are discussed, and methods of converting existing spruce forests into the desirable uneven-aged forms

of mixed forests are outlined.—W. N. Sparhawk.

3019. ELIOT, WILLARD AYRES. (Assisted by G. B. McLEAN.) Forest trees of the Pacific Coast, including a brief account of the outstanding characters, distribution and habitat of the trees native to Alaska, British Columbia, Washington and Oregon; most of which are also found in Idaho and northern California and eastward to the western slopes of the Rocky Mountains. Illus. principally from original photographs by GEORGE C. STEPHENSON. 565p. 303 fig. G. P. Putnam's Sons: New York, 1938. Pr. \$5.

This book was written to meet the increasing demand for a popular field book on the native trees of the Pacific Coast from Oregon to Alaska. The distinguishing characteristics of each tree (36 spp. and 1 var. of conifers and 52 spp. and 2 var. of broadleafs) are descr. briefly and illustrated by photographs. A key, based principally on the foliage, is presented for the identification of conifers and a principal leaf here is given for the based leaf and a pictorial leaf key is given for the broadleaf spp. For each sp. there are given the common names, the range and habitat, brief descriptions of leaves, fruit and wood, notes on size and economic uses, and other facts of nterest. Photographs show the whole trees as well as letails of foliage, fruit, and flowers. A final chapter, "Odds and Ends," contains an account of the use of various forest products by the Indians of the region.—W. N. Sparhawk.
3020. HELLINGA, G. Vergelijking tusschen opbrengstegevens van eenige Nederlandsch Indische en Europeesche

outsoorten. [Comparison of yields of some East Indian and European trees.] [With Eng. summ.] Tectona 31(11): 91-801. 5 pl., 3 fig. 1938.—Heights, diams., basal areas, umber of trees, and volume per ha. are compared for beech, pruce, Scotch pine, poplar (P. canadensis), teak, damar

(Agathis sp.), balsa (Ochroma), and djeundjing (Albizzia Albizzia in 12 yrs., poplar in 25 yrs., Agathis in 35 yrs., and the others in longer periods.—W. N. Sparhawk.

3021. HICOCK, HENRY W., and RAYMOND KIENHOLZ.

Red pine in Connecticut forest plantations. I. Volume tables for red pine, Pinus resinosa Solander. Connecticut Agric. Expt. Sta. Bull. 413. 563-570. 2 fig. 1938.—Volume tables and alinement charts are presented, based on 512 trees on 22 plots, for total vol. without bark and merchantable vol. with bark.-W. N. Sparhawk.

3022. KINLOCH, J. B. Report of the Forest Department of British Honduras for the year 1937. [15p.] Government Printer: Belize, [1938].—This is an account of the operations of the Department, including resource surveys and silvicultural operations in mahogany forests, with statistics on export of forest products.—W. N. Sparhawk.

3023. KOOPMAN, M. J. F., en L. VERHOEF. Octomeles

sumatrana Miq. (benoeang) en Tetrameles nudiflora R. Br. (winong). [With Eng. summ.] Tectona 31(11): 777-790. 4 pl. 1938.—O. sumatrana occurs throughout the Netherlands East Indies, except in Java and the Lesser Sunda Islands. It is a fast growing tree and reaches large size. The wood is light (air-dry sp. gr. av. 0.34), soft, brittle, and coarse, and is suitable for boxes but not for paper pulp. T. nudiflora also occurs throughout the N.E.I., except on Borneo and the islands between Borneo and Sumatra, in

regions with pronounced dry season. The wood is similar to that of O. sumatrana.—W. N. Sparhawk.

3024. LAMBERTS. Forstliches aus dem Regierungsbezirk Potsdam unter besonderer Berücksichtigung der Staatsforsten. Zeitschr. Forst- u. Jagdw. 70(11); 568-604. 1938.—Especial attention is given to the methods of establishing and managing oak and pine stands in the Potsdam district of Prussia, which has a forest area (State forest) of 176,937 ha. Of the present growing stock (142.6 cu.m. per ha.) oak constitutes 2.9%, beech 7.4%, other broadleaf spp. 1.9%, and conifers (mainly pine) 87.8%. The annual cut on a sustained-yield basis is 3.7 cu.m. per

ha.-W. N. Sparhawk.

3025. LAUGHTON, F. S. The raising of transplants of indigenous tree species for open-rooted planting. Jour. S. African Forestry Ass'n 1: 17-27. 10 pl. 1938.—Methods of raising transplants of Podocarpus latifolius, P. falcatus, P. henkelii, Ocotea bullata, Olea laurifolia, Curtisia faginea, Gonioma kamassi, Cunonia capensis, Faurea macnaughtonii, Rapanea melanophleos, and Ekebergia capensis, at the Deepvolse purposies in So. Africa and deep Superficielly nected. walls nurseries in So. Africa are descr. Superficially rooted plants are preferred, as they are more readily planted. They are produced by repeated transplanting in shallow beds over clayey subsoils and the roots are bent upward at the time of planting.—W. N. Sparhawk.

3026. MOSSERAY, R. Notes sur les associations végétales

rencontrées au cours de l'excursion de la Société en 1938. Bull. Soc. Centr. Forest. Belgique 45(10): 385-398. 2 pl. 1938.—Deals with the vegetation of the Ardennes region of Belgium, especially the pure beech forests. These probably evolved from mixed broadleaf forests, and are likely

to degenerate unless mixtures (oaks and secondary spp.) are restored.—W. N. Sparhawk.

3027. PARDÉ, LÉON, et MAURICE PARDÉ. Arbres et Forêts. 224p. Armand Colin: Paris, 1938. Pr. 17 fr. 50.— This book aims to give a popular account of the characteristics, distrib., management, and utility of forests, with particular reference to France. Part I deals with the nature of forests, the natural and human factors affecting forest distrib., and methods of forest management. Part II discusses the forest resources of the world, and Part III the trees, forest regions, and afforestation in France. Part IV takes up the products and less tangible benefits of the

forest.—W. N. Sparhawk.
3028. ROZE, E. Stādu sakņu sakārtojuma un vasas augstuma pieauguma korrelācija. [Correlation between the position of the roots and the height growth of plants.] [With Ger. summ.] Latvijas Mežu Pētīšanas Stacijas Raksti. [Reports Latvian Forest Research Sta.] 9. 61pp. 16 fig. 1938.—4-yr.-old spruce transplants and 2-yr.-old pine seedlings were planted by the hole, slit, and notch methods, and also by a "careless" slit method with the roots doubled back. Mortality was recorded, height growth measured, and typical roots examined 1 yr. and 5 yrs. after planting. Position of roots had no influence on height growth. With slit planting, especially when carelessly done, there was a greater tendency for the roots to die back, with the possibility of infection by fungi. In general, the planting method should depend on the soil. Slit planting carefully done is all right for young seedlings with simple root systems, but other methods are better for older transplants with much-branched roots. Slit planting is not suitable for stony soil,

because the pressure of the stones when the slit is closed may bruise or break the roots.—W. N. Sparhawk.

3029. SCHNARF, K. Der Samen der kiefernartigen Nadel-hölzer. Naturforscher 15(2): 48-53. Illus. 1938. 3030. SCHNELL, R. Variations de la forme du limbe chez les pousses normales de l'Epicéa (Picea excelsa Lamk.). Bull. Soc. Bot. France 85(5/6): 363-365. 1 fig. 1938.—In a normal shoot of spruce, the leaves at the base and at the top are slightly shorter than the others. The leaves at the base are generally broader than thick while all the other leaves are thicker than broad. Despite these differences in form and dimension all the leaves have a comparable anatomical structure.—P. D. Strausbaugh.

3031. SCHWICKERATH, M. Wälder und Waldböden

des Hohen Venns und seiner Randgebiete. Mitteil. Forstwirtsch. u. Forstwiss. 9(3): 261-350. 22 fig. 1938.—The Hohes Venn district lies on the border between Belgium and Germany, southeast of Aachen. This is a detailed account of the climate, soils, physiography, and vegetation, with results of analyses of numerous soil profiles and vegetation plots. During the last 120 yrs. large areas of natural oak and beech types have been afforested with spruce, which has had a deleterious effect on soil conditions. A classifica-

tion of the district on the basis of vegetation and soils is presented.—W. N. Sparhawk.

3032. SCOTT, M. H. South African grown furniture woods. Jour. S. African Forestry Ass'n 1: 41-46. 1938.—Several South African woods suitable for furniture making

are descr. briefly.

3033. SHERRY, S. P. The rate of growth and health of the southern pines in the Midland Conservancy. Jour. S. African Forestry Ass'n 1: 30-40. 2 pl., 1 fig. 1938.—Pinus palustris was introduced into the Midland district of So. Africa in 1910-1911; P. taeda in 1913; and P. caribaea in 1918. Extensive planting of P. taeda and P. caribaea was planted in the property of P. caribaea was planted in the property of P. caribaea. commenced in 1929, and some plantations of *P. echinata* have been established more recently. Many of the stands are unhealthy, as indicated by chlorosis, needle wilt, dwarf needles, and killing of the leaders and branch tips by Sphaeropsis pinicola. Observations on the rate of growth, health, and form of the first 3 spp. indicate that P. taeda can be grown successfully only on well-drained soils with ample moisture and high humus content, but that P. radiata will yield a larger volume of better timber on such sites. P. caribaea and P. palustris do well on a wide range of sites, although P. palustris grows so slowly that its use is not recommended. P. caribaea is recommended especially for poorly drained soils where neither P. radiata nor P. pinaster do well.—W. N. Sparhawk.
3034. VANSELOW, K. Ein Kiefernprovenienzversuch im

Lehrwald Wildtal der Staatlichen Forstamts Freiburg i.

Br. Allg. Forst- u. Jagd-Ztg. 114(11): 360-364. 1938.—2-yr. old pine transplants grown from seed from 3 German sources were planted in 1931 in 8 sample plots near Freiburg. At the close of the 1936 growing season the trees from local seed were the tallest, but those from East Prussian seed had much the better form and a lower rate of mortality.-W. N. Sparhawk.

3035. WETTSTEIN, W. von. Lichtbedürfnis und Dürrewiderstandsfähigkeit der Kiefer. Forstwiss. Centralbl. 60 (22): 703-711. 2 fig. 1938.—Seed of *Pinus silvestris* from 2 localities in central Germany was sown at the Kaiser Wilhelm Institute at Müncheberg, along with seed of local pine, partly in shaded and partly in unshaded beds. The av. mortality of the local stock was much less, both with and without shading. The difference was probably due mainly to difference in drought resistance of the several strains of pine, though difference in light requirements may

have played a minor part.—W. N. Sparhawk.

3036. WIEDEMANN. Aus den Erfahrungen der nordwestdeutschen Forstwirtschaft. Nederland. Boschbouw-Tijdschr. 11(12): 518-527. 1938.—A résumé of experience in establishing and managing forests in NW Germany, especially on heaths. As a rule, land should be plowed up before planting and young stands should be handled so as to insure closure of the canopy before the heather regains a foothold. Mixtures are desirable, but only those spp. should be employed that will grow well together, at least up to the pole stage. Liming generally results in increased yields, especially with spruce.—W. N. Sparhawk.

3037. WINTERS, R. K., J. A. PUTNAM, and I. F. ELDREDGE. Forest resources of the north-Louisiana delta. U. S. Dept. Agric. Misc. Publ. 309. 1-49. 1 pl., 11 fig. 1938.— Information is presented as to the general description of the timber, increment of timber, forest-product industries, the present situation, and future developments.—J. W.

Wellington (courtesy Exp. Sta. Rec.).

3038. ZENTGRAF, EDUARD. Technische Sturmsicherung von Fichtenbeständen. Allg. Forst- u. Jagd-Ztg. 114 (11): 358-360. 1938.—Rossmässler's method of increasing windfirmness of the trees on the exposed edges of spruce stands is to cut off the branches on the side opposite the main wind direction. The success of this method is shown for 4 sample areas. Cutting off the tops of border trees or removal of branches that stand perpendicular to the wind direction give poorer results.—W. N. Sparhawk.

3039. ZIMMERLE, H. Zuwachsuntersuchungen bei der Fichte im fürstl. Forstbezirk Härtsfeldhausen. Allg. Forst-u. Jagd-Ztg. 114(11): 341-351. 2 fig. 1938.—Growth in height, diam. (at 1.3, 5, 11, and 17 m. above the ground and at $\frac{1}{2}$ the merchantable height), basal area, and volume of 12 sample dominant spruce trees inside an 80-90 yr. old stand was compared with the growth of 12 trees of approximately the same sizes from the outer edge of the same stand, which had been managed under the Wagner border-cutting method for the last 20 yrs. The outside trees were shorter than the others and had longer crowns, but were more full-boled. They had grown $1\frac{1}{2}$ -2 times as fast in diam. at all heights, as the trees within the stand, and had greatly surpassed those trees in basal area and vol. growth. An ave. of 32-34 yrs. was required for the border trees to pass from the 2d to the 5th "Homa" class (quality class based on length, diam., and taper, which determines the value of the log), while 46-48 yrs. was required for trees in the interior of the stand.—W. N. Sparhawk.

3040. ANONYMOUS. Gold Coast timbers. 27p. Map, 11 col. pl., Colonial Forest Resources Development Dept.: London, 1938.—Woods of the following 11 spp. are illus. in natural color and descr. briefly, with information on workability, uses, and quantities available for export: avodire (Turraeanthus sp.), dahoma (Piptadenia africana), danta (Cistanthera papavifera), denya (Cylicodiscus gabunensis), guarea (G. sp.), idigbo (Terminalia ivorensis), (Mimusops heckelii), mansonia (Mansonia altissima), obeche (Triplochiton scleroxylon), opepe (Sarcocephalus diderichii), and sapele (Entandrophragma cylin-

dricum).—W. N. Sparhawk.

PHARMACOGNOSY AND PHARMACEUTICAL BOTANY

HEBER W. YOUNGKEN, Editor

(See also in this issue Entries 1980, 2303, 3079)

3041. AMTHOR, LISELOTTE. Zur Toxikologie des Pantherpilzes (Amanita pantherina D. C.). 21p. Thesis: University of Würzburg, 1936.—Extracts of A. p. which had been preserved in alcohol, had little effect on cats and frogs beyond a weak muscarin-like action. Since this fungus can be very poisonous, it is concluded that the amount of poison contained in the higher fungi fluctuates.—W. Groves.

3042. BECKLEY, V. A., C. B. GNADINGER, and FRANK

3042. BECKLEY, V. A., C. B. GNADINGER, and FRANK IRELAND. Pyrethrum flowers. (Kenya, a better source.) Indust. and Engineer. Chem. 30(7): 835-838. 1938.—Description of the growing, curing and shipping of extremely high quality pyrethrum flowers from Kenya; Japan has previously supplied the best quality.—M. C. Moore.

3043. BRAMBILLA, M., e G. BALB. Per un'utilizzazione dell'alio di semi di tabasco pell'industria della pittura e

3043. BRAMBILLA, M., e G. BALBI. Per un'utilizzazione dell'olio di semi di tabacco nell'industria delle pitture e vernici. [The utilization of tobacco seed oil in the paint and varnish industry.] Chim. e Indust. 20(8): 548-551. 1938.

—Composition and properties of tobacco seed oil are given.

—R A McDermott

F. A. McDermott.

3044. DILLON, T. The seaweed industry and the possibility of its revival. Chem. and Indust. [London] 57: 616-618. 1938.—Seaweed, once commercially important for its potash and I content, is now being investigated with a view toward utilizing the alginic acid found in large quantity in it. Na alginate has been used as (1) a dressing in the textile industry, (2) a clarifying agent in the sugar industry, (3) an agent for preventing scale formation in boilers. (4) and as a fireproofing agent.—R. Tahenkin.

quantity in it. Na alginate has been used as (1) a dressing in the textile industry, (2) a clarifying agent in the sugar industry, (3) an agent for preventing scale formation in boilers, (4) and as a fireproofing agent.—B. Tabenkin.

3045. ITALLIE, L. van. [Soma-homa—holy plant of the Indians and Persians.] Pharmaceut. Weekblad 74: 5. 1937.—The author discusses the mythology of Soma, one of the principal gods of the ancient Indians. A plant often mentioned in ancient writings in connection with sacrifices to this god has also been named Soma and is probably the same as the Haoma in Persian mythology. Various condicting statements appear in the literature as to the identity of this plant. The author received a cutting of Sarcostemma acidum from Malabar. This plant is used by the Nambudiri Indians in Soma sacrifices at the present time. The cutting was planted and yielded after cultivation, about 100 plants which were used in a preliminary phytochemical investigation. S. acidum is a hanging plant with a fleshy green leafless stem not over 3 or 4 mm. thick. The stem contains a white latex having a strongly acid, slightly bitter but not astringent taste. The stems were comminuted and pressed and the juice as well as an alcoholic extract of the marc after expression was investigated. The acid reaction seems to be due to malic acid; citric, oxalic and tartaric acid were not found. The carbohydrate consists of small quantities of reducing sugar and saccharose. Tannins appear to be present by the ferric chloride test but could not be detected by the ammoniacal AgNO₂ test. The tannin question needs further investigation and clarification. A phytosterol with a melting point of about 142° and a glucoside precipitated with basic lead acetate were found. A small amt. of alkaloid (300 g. of material yielded less than 1 mg.) which gave precipitates with picric acid, potassium-mercuric iodide and KI was also found.—E. H. W. (courtesy Jour. Amer. Pharm. Assoc.).

3046. La ROTONDA, C., e G. PETROSINI. Il clima e la piante oleaginose. V. Ulteriori ricerche sulla Soia hispida. [Climate and oil plants. V. Further researches on Soja hispida.] Ann. R. Accad. Agric. Torino 80: 141-153. 1937 (1983)

(1938).
3047. POST, ERIKA. Zur Okonomie des Bostrychietum. Planta 28(4): 743-744. 1938.—Two packets of Catenella purchased in Rangoon contained also Bostrychia radicans, Caloglossa adnata, C. leprieurii, Bostrychia binderi, C. beccarii and Catenella impudica and Chondria riparia. These and Catenella nipae must be counted among the economic algae.—B. R. Nebel.

3048. ROWAAN, P. A. [Requirements for Folia orthosphonis and Rhizoma curcumae javanicae.] Pharmaceut. Weekblad 74: 910. 1937.—From the viewpoint of regulation the author suggests the following standards for these

Netherlands-Indian drugs: Folia Orthosiphonis Javanici or Javanese Orthosiphonis leaves (koemis koetjing); the unground leaves of Orthosiphon stamineus Benth. (synonym Orthosiphon grandiflorus Bold.); color: light green (petioles and veins purple); odor: aromatic, characteristic; taste: saline, somewhat bitter and astringent; unavoidable impurities: not more than 2% of stem fragments more than 1 mm. thick; moisture: not more than 13%; ash: 8-12% (with high K content); acid-insoluble ash (sand): not more than 2%; aqueous extract: not less than 40% (calculated on the dried drug). Rhizoma Curcumae Javanicae or Javanese Curcuma Root (temoe lawak); the rhizome of Curcuma xanthorrhiza, in thin, unground disks; color: orange-yellow to orange-brown; odor: aromatic, characteristic; taste: spicy and somewhat bitter; moisture: not more than 12%; ash: 3-7%; acid-insoluble ash (sand): not more than 1%; volatile oil content: not less than 5%.

—E. H. W. (courtesy Jour. Amer. Pharm. Assoc.).

3049. ST. PFAU, ALEXANDRE. Etudes sur les matières végétales volatiles. VII. Sur l'huile essentielle des bourgeons du Populus trichocarpa Torr. et Gray. Helvetica Chim. Acta 21(6): 1524-1531. 1938.—The principal constituents of the oil of the buds of P. trichocarpa are benzyl salicylate and benzyl benzoate, with smaller amounts of p-hydroxyacetophenone, and free cinnamic and N-butyric acids. A paraffin, C₂₅H₂₅, is also present, together with a lactone having a coumarin-like odor, phenols or phenolic esters, and probably methyl salicylate.—F. A. McDermott.

3050. SPOON, W. Derriswortel als handelsproduct. [Derris root as commercial product.] Tijdschr. Plantenziekten 44(4): 214-216. 1938.—The means of distinguishing roots of D. elliptica and of D. malaccensis according to their % of ether extract and content of rotenone, are given. The desirable proportions of these 2 for spraying and dusting purposes in mixtures of both are given.—H. L. G. de Bruyn.

3051. ULTEE, A. J. [Volatile oil from Pittosporum monticolum.] Pharmaceut. Weekblad 74: 666. 1937.—The investigation of the volatile oil [described] obtained from the fruits of trees growing in 2 localities in the neighborhood of Poedjon and from a single tree near Nongkodjadjar is described. The fruits of the former yielded 0.6% of volatile oil; those from the single tree yielded only 0.02%. The oil was colorless and possessed a turpentine-like odor. It was not miscible with 80% alcohol. α-Pinene and β-pinene were identified in it.—From abstract by E. H. W. (courtesy Jour. Amer. Pharm. Assoc.).

3052. VEEN, A. G. van. Kunnen peteh-boonen djen-kolvergiftigingen veroorzaken? [Can peteh-beans cause djenkol poisoning?] Geneesk. Tijdschr. Nederland.-Indië 78(42): 2619-2621. 1938.—In peteh beans (Parkia speciosa) no djenkolic acid could be detected, and only about 1% of cystine. In one instance more than 0.4 g. of pure djenkolic acid was isolated from the urine of a djenkol patient who had eaten 5 young djenkol beans. The white concretions found in the ureter of djenkol poisoning patients and which often occlude this entirely proved to consist of nearly pure djenkolic acid.—W. Rudolfs.

3053. WERTH, E. Weitere Untersuchungen an Prä-

3053. WERTH, E. Weitere Untersuchungen an Prähistorischen Kulturpflanzen. Ber. Deutsch. Bot. Ges. 55 (10): 622-630. 1937 (1938).—This is the 16th of a series of papers on the geography and history of cultivated plants and domesticated animals. During the iron age of the Burgwall settlements in Lower Neuendorf (c. 600 B.C.) the cultivated plants were Hordeum polystichum, Triticum vulgare, Panicum miliaceum, Vicia faba var. celtica nana, Pisum sativum, Lens esculenta var. microsperma. From other regions during the same period are reported acorns of Quercus pedunculata, and nuts of Corylus avellana. From the bronze age are reported Panicum miliaceum and Hordeum polystichum. During the neolithic age of various localities the following are reported: Hordeum polystichum, Triticum compactum, T. dicoccum, T. monococcum, T. vulgare, and I. aegilopoides boeoticum.—H. C. Beeskow.

3054. WING, W. T. The assay of plaster ef belladonna.

Quart. Jour. Pharm. and Pharmacol. 11(3): 489-495. 1938.— The assay method as given for the U.S.P. plaster of belladonna is not applicable for the British Pharmacopoeia plaster. The 2 plasters have different bases. The B. P. plaster contains Pb, and when this is present the U.S. P. method for assay of a plaster with a rubber basis is inapplicable. A suitable method for assay of the B. P. plaster is given.—H. A. McGuigan.

plaster is given.—H. A. McGuigan.

3055. ZOBEL, ROLF. Beiträge zur Toxikologie der Speiselorchel (Helvella esculenta). 29p. Thesis: University of Würzburg, 1932.—The water in which H. e. had been cooked caused death in dogs, white mice, and frogs. Hemo-

globinuria was a striking symptom in dogs but was not observed in mice or frogs. The chief symptoms in mice were great weakness and uncertainty of movement, and in frogs, irregular breathing and paralysis. A cold water extract of the dried fungus also produced convulsions and death in white mice. Some differences were found in the poisonous properties of fungi from different regions. Exps. with washed erythrocytes of cattle and hogs failed to disclose a specific hemolytic substance. Some samples of commercial products labelled "Morels" were found to contain specimens of H. esculenta. H. gigas was not poisonous to dogs even in large doses.—W. Groves.

PLANT PHYSIOLOGY, BIOCHEMISTRY, AND BIOPHYSICS

F. E. DENNY, Editor

(See also in this issue Entries 1664, 1752, 1840, 1842, 1887, 1888, 1903, 2018, 2042, 2726, 2732, 2742, 2747, 2917, 2925, 2943, 2986, 2988, 2992, 3028, 3046, 3134, 3135, 3229)

ABSORPTION, NUTRITION

3056. RAJAGOPAL, S., and A. V. VARADARAJA IYENGAR. Studies on the chemical composition and physical properties of plant tissue fluids. II. Effect of mineral fertilisers on the tissue fluids of ragi (Eleusine coracana, Linn.). Jour. Indian Inst. Sci. 21A(9): 103-113. 1938.—Samples were taken from varying fertilizer treatments made on plants grown in pots containing a medium composed of soil mixed with \$\frac{1}{3}\$ washed sand. N proved so limiting that it was applied to all treatments but the controls in a 2d series. The controls were stunted and their sap contained more dry matter, ash, P and K₂O as well as being more alkaline, than that from fertilized plants. The tops of plants receiving NaNOs contained juices which were higher in N. K₂O treatments increased the solids in the juices, but did not give consistent or striking increases in K conc. Applications of superphosphate gave consistently greater concs. of P in the sap and P deficiencies were detected. Striking changes in sap composition took place during the flowering stages about 3 months after planting.—

E. M. Emmert.

3057. STEINBERG, ROBERT A. Correlations between biological essentiality and atomic structure of the chemical elements. Jour. Agric. Res. 57(11): 851-858. 1938.—Correlations were found between atomic structure and biological essentiality of the chemical elements that would indicate that the essential elements are closely correlated with respect to atomic structure and their distribution among the non-essential elements. Tentative, though vague and debatable, deductions are feasible with respect to the number and identity of the essential elements as yet unknown. A suggested form of chemical periodic table based on shell and subshell of transition, atomic number, and rank, is superior in certain respects to the standard table. Moreover, this arrangement of the chemical elements makes possible the correlation of atomic structure with the property of biological essentiality.—R. A. Steinberg.

cal essentiality.—R. A. Steinberg.

3058. THOMAS, WALTER. Mathematical expression of equilibrium between lime, magnesia, and potash in plants. Science 88(2279): 222-223. I fig. 1938.—In continuation of his studies of foliar diagnosis, the author presents and discusses a graphical expression, plotting in trilinear coordinates a magnitude designated as the CaMgK unit, representing the equilibrium between CaO, MgO, and K₂O at the moment of sampling, derived by converting the percentage composition for CaO, MgO, and K₂O of the 3d leaf into mg.-equivalent values, and determining the proportion each of these bears to the mg.-equivalent total.—F. V. Rand (courtesy Exp. Sta. Rec.).

AUXINS, GROWTH HORMONES

3059. AMLONG, H. U. Wuchsstoffhaltige Warmbäder als Wurzeltreibmittel bei Stecklingen. Ber. Deutsch. Bot. Ges. 56(7): 239-246. 1938.—Grape cuttings were placed in various cones. of heteroauxin in water at temps. ranging from 20° to 35° C for 12 hours. They were then kept in tap water for 5 weeks. Best root formation occurred in

those that had been exposed to heteroauxin at 25° C. Etiolated pea sprouts were treated with various cones, of heteroauxin for various lengths of time at 3 temps. They were then grown on 1½% glucose soln. and observed after a week. Maximum root formation took place in the seedlings which were exposed to 25° C regardless of time or cone. If during a 12-hour treatment with heteroauxin the temp. was raised from 20° to 25° C best root formation occurred in a 1:10,000 cone.—H. C. Beeskow.

3060. FISCHNICH, O. Die Rolle des Wuchsstoffes bei der Bildung von Adventivsprossen und -wurzeln. Ber. Deutsch. Bot. Ges. 56(4): 144-152. 1938.—A callus of Populus nigra var. pyrimidalis may give rise to either roots or shoots depending upon the conc. of sodium indole acetate in the callus. A high heteroauxin content favors root formation whereas a low content favors shoot development. A normal root forming callus can be induced to form shoots by depressing the activity of the heteroauxin. This can be done by ringing above the callus forming region. A normal sprout forming apical callus will form roots if a strong (0.25%) solution of auxin is added.—H. C. Beeskow.

3061. LINK, G. K. K., and V. EGGERS. Inhibition of adventitious bud initiation in hypocotyls of flax by indole-3-acetic acid and flax extract. Nature [London] 142(3591): 398-399. 1938.

3062. LOOFBOUROW, JOHN R., and CECILIA MARIE DWYER. Intercellular wound hormones produced by heteroauxin. Science 88(2278): 191-192. 1938.—Heteroauxin proved toxic to yeast over a wide conc. range. When yeast was subjected to it in toxic concns. wound hormones were produced. This effect on yeast is considered consistent with the mode of action suggested by Leonian and Lilly for the heteroauxin effects on plant tissues.—F. V. Rand (courtesy Exp. Sta. Rec.).

the rooting of woody ornamental plants. Ohio State Bimonthly Bull. 191. 56-62. 1938.—Using both crystalline acids and proprietary substances, tests were made on 110 or more spp. of woody ornamentals: 57 spp. rooted and showed some response to treatment. The more mature and harder the wood, the stronger the conc. and the longer the length of treatment required. There was a saving in time of rooting of as much as from 2 to 3 weeks in certain spp. In general, the greater response was secured from young cuttings, possibly because of the greater content of natural hormones in the younger tissues. No significant difference was observed between the crystalline acids and the proprietary materials. Much more work is needed on the optimum concs, especially for naturally difficult rooting spp. Among spp. which did not respond to treatment were Abelia grandiflora, Cotoneaster spp., Daphne cneorum, Deutzia lemoinei, Juniperus virginiana, Prunus pissardi, and Ulmus pumila.—J. W. Wellington (courtesy Exp. Sta. Rec.).

3064. SCHLENKER, G. Die Bedeutung der Wuchsstoffe für Gärtnerei und Landwirtschaft. Naturforscher 15(3): 92-95. Illus. 1938.

3065. SEGELITZ, GÜNTHER. Der Einfluss von Licht

und Dunkelheit auf Wurzelbildung und Wurzelwachstum. Planta 28(4): 617-643. 14 fig. 1938.—Corn seeds were first deprived of fat by shaking them with a 3.2% soln. of persil, then washed in tapwater for 24 hours and transferred to H₂O₃ 3%, shaken for 20 min., then treated with 1% chloramin (Heyden A. G.) with shaking for 1 hour, then germinated. The medium used was according to Fiedler-White without yeast extract. The sprouts were exised when 1-2 cm. long. Only if light had been admitted were adventitious roots formed. Adding heteroauxin paste 1:1000 induced root formaton without light. Sprouts, if not cut until more than 2 cm. long, produced roots even in the dark. Excised roots grew fast, bending irregularly if grown in darkness. In light they grew more slowly and showed strictly positive geotropism. The roots grown in the light evidently had growth substance. This was shown by adding indolacetic acid as well as by addition of extracts from roots grown in light and dark respectively.—B. R. Nebel.

3066. Van OVERBEEK, J., and JAMES BONNER. Auxin in isolated roots growing in vitro. Proc. Nation. Acad. Sci. U. S. A. 24(7): 260-264. 1938.—Isolated Pisum roots cultivated in vitro contain auxin for at least 3 weeks after the original tip was removed from the germinating seeds. This auxin obtained from roots under sterile conditions was auxin-a. A steep auxin gradient was found in these isolated roots, the highest conc. being found in the tip. Roots after 2 weeks' cultivation in vitro appear to contain less auxin than did the initial root tips.—Auth.

WORLEY, CLAIR L., and B. M. DUGGAR. Colletotrichum circinans as a semiquantitative test unit for the growth substance produced by Rhizopus suinus. Science 88(2275): 132. 1938.—Use of C. circinans as described has advantages over the Aspergillus niger method, viz. the change in yield is greater per increment of growth substance added, replicates show lesser variations, temp. fluctuations over a few degrees are of little significance, and successive daily changes in growth rate for a given culture can be recorded and studied.—F. V. Rand (courtesy Exp. Sta. Rec.).

OSMOSIS, PERMEABILITY

3068. BORRISS, HEINRICH. Die Abhängigkeit der Aufnahme und Speicherung basischer Farbstoffe durch Pflanzenzellen von inneren und aüsseren Faktoren. Ber. Deutsch. Bot. Ges. 55(10): 584-597. 1937(1938).—The effect of various external and internal factors on the absorption and storage of basic dyes by the epidermal cells of the onion was studied. The vital staining of the vacuole with neutral red and methylene blue is correlated with pH values, research of several extens light rectainty. red and methylene blue is correlated with pH values, presence of several cations, light, maturity of cells, etc. The type of buffer (phosphate or acetate) influences the rate of staining. At pH 5-7.7 methylene blue is absorbed only in acetate buffers. The presence of 0.1M KCl and 0.2M CaCl causes a strong absorption of neutral red. Strong light hinders vacuolar staining. The staining of membranes is somewhat retarded by the presence of K but strongly retarded by Ca. The velocity of dyes across membranes is regulated by the conc. of the dye and by the specific action of certain salts on the membrane.—H. C. specific action of certain salts on the membrane.—H. C. Beeskow.

3069. COLLANDER, RUNAR, und ALICE HOLMSTRÖM. Die Aufnahme von Sulfosäurefarbstoffen seitens pflanzlicher Zellen—ein Beispiel der adenoiden Tätigkeit der Proto-plasten. Acta Soc. Fauna et Flora Fennica 60: 129-135. 1937 (rec'd 7-14-38).—The absorption of sulphonic acid dyes by the parenchyma cells surrounding the vascular bundles of perianth leaves is greatly inhibited by the absence of free oxygen. This observation corroborates the views put forth by Höber according to whom the entrance of sulphonic acid dyes is not the result of simple diffusion processes alone but is an example of the adenoid activity (or "physiological permeability") of the protoplasts, an activity involving performance of work and therefore depending on an adequate energy supply by means of aerobic respiration.—R. Collander.

3071. JACQUES, A. G., and W. J. V. OSTERHOUT. The accumulation of electrolytes. XI. Accumulation of natrate by Valonia and Halicystis. Jour. Gen. Physiol. 21

(6): 767-773. 1938.—The nitrate conc. in the sap of Valonia macrophysa Kütz. is at least 2000 times that of the sea water, and in Halicystis osterhoutii Blinks and Blinks at least 500 times that of the sea water.—Auth. summ.

3072. JACQUES, A. G. The accumulation of electrolytes. XII. Accumulation of halide and nitrate by Valonia in hypertonic solutions. Jour. Gen. Physiol. 21(6): 775-780. 1938.—When cells of Valonia macrophysa were placed in hypertonic sea water, the concentration of halide and of nitrate increased, and the sum of halide + nitrate became 0.05 M greater inside than outside, which is about the same difference as is found in cells in normal sea water. In ordinary sea water the ratio of halide to nitrate is 80,000 to 1. When this was changed by substituting nitrate for halide so that the conc. of halide was 1.75 times that of nitrate, the rate of entrance of halide was 1.68 times that of nitrate in 276 hrs. and the ratio of halide to nitrate in the sap decreased from 38 to 18.5. No halide came out in exchange for entering nitrate.—From auth. summ.

3073. JACQUES, A. G. The kinetics of penetration. XV. The restriction of the cellulose wall. Jour. Gen. Physiol. 22(2): 147-164. 1 fig. 1938.—When Valonia cells are impaled on capillaries, it is in some ways equivalent to removing the comparatively inelastic cellulose wall. Under these conditions sap can migrate into a free space and it is found that on the average the rate of increase of volume of the sap is 15 times what it is in intact cells kept under comparable conditions. The increase of volume is a little faster during the first few hours of the exp., but the rate as the exp. is continued. The slightly faster rate at first may mean that the osmotic pressure of the sap is approaching that of the sea water. This might result from a more rapid entrance of water than of electrolyte, as would be expected when the restriction of the cellulose wall was removed. During the linear part of the curve the osmotic conc. and the composition of the sap suffer no change, so that entrance of electrolyte must be 15 times as fast in the impaled cells as it is in the intact cells.—From auth. summ.

3074. KNODEL, HANS. Eine Methodik zur Bestimmung der stofflichen Grundlagen des osmotischen Wertes von Pflanzensäften. Planta 28(4): 704-715. 1938.—The osmotic value is due to 3 types of materials: salts, sugars and organic acids. The salts make the largest contribution. 4-13% of the osmotic value is not directly accounted for.— B. R. Nebel.

3075. MEYER, BERNARD S. The water relations of plant cells. Bot. Rev. 4(10): 531-547.2 fig. 1938.—Discussion of osmosis and osmotic pressure, and osmotic relations of plant cells, imbibition and imbibition pressure, dynamics of intercellular movement of water, and water relations

within individual cells.—L. Benson.

3076. OSTERHOUT, W. J. V. Changes of apparent ionic mobilities in protoplasm. III. Some effects of guaiacol on Halicystis. Jour. Gen. Physiol. 21(6): 707-720. 1 fig. 1938.—Lowering the pH of sea water from 8.2 to 6.4 lowers the positive P.D. of Halicystis reversibility. Exposure to the positive r.D. of Autoysus reversionity. Exposure to see water at pH 6.4 does not affect the apparent mobility of Na+ or of K+. Guaiacol makes the P.D. less positive. Exposure to guaiacol does not reverse the effect of KCl in Halicystis which in this respect differs from Valonia. The h.D. can be changed from 66 mv. positive to 23 mv. negative by the combined action of KCl and guaiacol. Exposure to guaiacol affects *Halicystis* and *Valonia* simi-Exposure to guaiacol affects Halicystis and Valona similarly in respect to their behavior with dilute sea water. Normally the dilute sea water makes the P.D. more negative but after sufficient exposure to guaiacol dilute sea water either produces no change in P.D. or makes it more positive. In the latter case we may assume that the apparent mobility of Na + has become greater than that of Cl—as the result of the action of guaiacol. (Normally the apparent mobility of Cl— is greater than that of Na +.) In Halicystis, as in Valonia and in Nitella, an organic substance can greatly change the apparent mobilities of certain inorganic ions (K+ or Na+)—Auth. summ.

3077. OSTERHOUT, W. J. V., and S. E. HILL. Calculations, of bioelectric potentials. IV. Some effects of calcium on pot entials in Nitella. Jour. Gen. Physiol. 22(2): 139-147.

1 fig. 1938—In Nitella the substitution of KCl for NaCl

on pot entials in Nitella. Jour. Gen. 1 1938.—In Nitella the substitution of KCl for NaCl

changes the P.D. in a negative direction. In some cases this change is lessened by adding solid CaCl₂ to the soln. of KCl. This may be due to lessening the partition coefficient of KCl or to decreasing the solubility of an organic substance which sensitizes the cell to the action of KCl. Little or no correlation exists between this effect of Ca and its ordinary antagonistic action in producing a balanced solution which preserves the life of the cell indefinitely. CaCl₂ is negative to NaCl, positive to KCl.—From auth. summ.

3078. WHITAKER, D. M. The effect of hydrogen ion concentration upon the induction of polarity in Fucus eggs. III. Gradients of hydrogen ion concentration. Jour. Gen. Physiol. 21(6): 833-845. 1938.—Gradients of pH across Fucus eggs growing in sea water determine the developmental polarity of the embryo and may determine polarity even if removed before the morphological response begins. The rhizoid forms on the acid side of the egg unless this is too acid, in which case it develops on the basic side of the egg. H ions may exert their effect by activating growth substance. H ions or CO₂ probably also affect the underlying rhizoid forming processes in other ways as well.—From auth. summ.

GERMINATION, DORMANCY

3079. KOZ'MÏNÄ, N. P., i M. C. ROMÄNOVÄ. Izmenenië klěikoviny v profizesse prorostaniia pshěniizy. [Changes in gluten in the process of sprouting of wheat.] [In Russ. with Eng. summ.] Biokhimiia [Biochem.] 3(3): 378-386. 1938.—Up to 4th or 5th day of sprouting there is only a small decrease in gluten but it undergoes marked qualitative changes. It becomes crumbly and inelastic and produces a dough of poor elasticity and a smaller volume of bread. Immediate cause of the change is hydrolysis of fats causing an accumulation of unsaturated fatty acids which alter the colloidal properties of gluten. Secondly, proteolytic enzymes are activated which cause degradation of gluten. In later stages of sprouting no gluten could be obtained.—E. K. Johnson.

3080. LAIBACH, F., and J. KEIL. Über die keimungshemmende Wirkung der natürlichen freien Blausäure. Ber. Deutsch. Bot. Ges. 55(10): 579-583. 1937(1938).—Previous report by Borris (1936) states that the seeds of Vaccaria pyrimidalis contain a substance which inhibits germination, is volatile, and is readily adsorbed by soil and animal charcoal. The authors believe this substance to be HCN. If emulsin is present the amygdalin in the seeds of Prunaceae and Pomaceae releases a CN group which inhibits germination. When the HCN is adsorbed by charcoal there is no inhibiting action.—H. C. Beeskow.

coal there is no inhibiting action.—H. C. Beeskow.

3081. LEE, W. Y., and SHING-LUNG LI. Distribution of phosphorus in the germinating soybean. Chinese Jour. Physiol. 13(3): 257-264. 6 fig. 1938.—During 15 days' germination at 28° C the total and acid soluble P (90% of total) of the seedlings was constant while transfer occurred from cotyledons to embryos. Total lipoid P decreased 9 to 3 mgm. per 100 seedlings in the first 3 days but that in the embryos tripled in 15 days.—C. D. Stevens.

PHOTOPERIODISM

3082. WOYCICKI, ST., M. GRZYBOWSKI. Wplyw dlugosci dnia na rozwoj i kwitnienie zlocieni (Chrysanthemum indicum L.). [Studies in photoperiodism as applied to the chrysanthemum.] [Polish. with English summary.] Roczniki Nauk Ogrodniczych (Ann. Sci. Hort.) [Warsaw] 5: 141-176. 1938.—Chrysanthemum is classified as a short-day plant. Even in midsummer, flowering is quickly initiated by daily exposure to 10-12 hours of daylight. Darkening of plants from 8 p.m. to 7 or 8 a.m. was most effective of any periods tried. Plants darkened from 10 a.m. to 2 p.m. bloomed later than the normal.—From. auth. summ.

PHOTOSYNTHESIS

3083. BAUR, EMIL, K. GLOOR, und H. KÜNZLER. Über die Photolyse der Kohlensäure. Helvetica Chim. Acta 21(5): 1038-1053. 1938.

3084. SMITH, EMIL L. Solutions of chlorophyll-protein compounds (phyllochlorins) extracted from spinach. Science 88(2277): 170-171. 1938.—The author believes that the 2

proteins obtained may correspond with phyllochlorins a and b. It appears that the classical organic chemical studies of the chlorophylls and carotenoids were concerned with the prosthetic groups of extremely complex catalysts. Presumably there are many additional components concerned in photosynthesis, since phyllochlorin does not elicit photosynthesis in vitro.—F. V. Rand (courtesy Exp. Sta. Rec.).

NITROGEN METABOLISM

3085. MOTHES, K. Stickstoffbilanz und Stickstoffverlust. Planta 28(4): 599-616. 1938.—Total N was detd. in the nutrient soln. and in the plants by the Kjeldahl method. The material was reduced in alkaline solution with Devarda alloy at 30-40°. Escape of NH₃ was prevented by absorption with acid. Cut leaves standing in water with their stems or bases do not lose much N. N- losses occur from release of molecular N. According to the scheme HNO₂+RNH₃=N₂+ROH+H₃O. The presence of nitric amino N and high acidity are required. This type of loss is not important in normal nitrate reduction. In expressed juices and fungus cultures nitrate occasions large N- losses indicating that nitrite is formed. With yeast the presence of sulf-hydrils indicates that these may enhance nitrate reduction. A release of N from reduced N was never observed. It is possible that this N₂ release may serve for detoxifying the cell from nitrite.—B. R. Nebel.

HARDINESS, LOW TEMPERATURE RELATIONS

3086. CLEMENTS, HARRY F. Mechanisms of freezing resistance in the needles of Pinus ponderosa and Pseudotsuga mucronata. Res. Stud. State Coll. Washington 6(1): 3-45. 29 fig. 1938.—The water content of the needles was greatest in midwinter and least when the needles were changing from winter to spring conditions. The youngest needles always had the highest water content, and the old the lowest. In general, pine needles had higher levels than Douglas fir. These results correlated rather well but inversely with low-temp. resistance. In completely developed needles the total N (mostly insoluble) based on residual dry weight showed no essential variations in relation to season or age, and there seemed to be no marked variations in the soluble N fractions which could be correlated with winter temps. However, the carbohydrates showed striking variations and correlations with both age and season. The soluble sugars were at maxima during the coldest part of winter, and a 2d accumulation was correlated with rapid synthesis in spring and early summer. The highest cones, were found in the oldest needles, and the fir needles contained considerably more than the pine. The sugars apparently play a major rôle in low-temp. resistance. Starch was very abundant during rapid synthesis but otherwise was present in very small amounts. The more permanent acid-hydrolyzable materials seemed also to be involved in the resistance mechanism. Fatty materials showed a strong correlation with winter temps. The rôles which may be played by these various materials are fully discussed, with special reference to the mechanism of freezing resistance. F. V. Rand (courtesy of Exp. Sta. Rec.).

3087. LUYET, B. J., and G. THOENNES. The survival of plant cells immersed in liquid air. Science 88(2282): 284-285. 1938.—Epidermal cells of onion immersed in liquid air were all dead on being brought back in air to room temp., but if previously dehydrated by plasmolysis in 5-15% NaCl soln. before immersion in liquid air and if returned rapidly to room temp. by immersing again in the salt soln., many cells remained intact and could be deplasmolyzed or further plasmolyzed. The author believes that the prevention of crystallization prevents protoplasmic disorganization.—H. P. Barss (courtesy Exp. Sta. Rec.).

ASCORBIC ACID

3088. BONNER, JAMES, and DAVID BONNER. Ascorbic acid and the growth of plant embryos. Proc. Nation. Acad. Sci. U. S. A. 24(2): 70-75. 2 fig. 1938.—Excised pea embryos of 9 vars. were cultivated upon nutrient medium to which varying amounts of crystalline ascorbic acid was added. Growth measurements of the seedling were made for 4 weeks, at the end of which time the ascorbic acid content of the seedling was detd. by chemical analysis. They were

then compared as to synthesis of and growth response to ascorbic acid. The vars, showing a large growth response to added ascorbic acid contained little ascorbic acid; vars, showing little growth response showed much more ascorbic acid; vars.

acid on analysis.—J. Bonner.

3088A. GUDLET, M. A., i E. K. KARDO-SYSÖYEVA.

K "issledovani" sostofani" vitamina C v rästeni" akh. [The condition of vitamin C in plants.] [In Russ. with Eng. summ.] Biokhimi" [Biochem.] 3(3): 334-347. 1938.—Structural elements of horse-radish, prepared in absence of O2, aid the reversible oxidation of reduced ascorbic acid; the filtrate aids the further destruction of dehydroascorbic acid. The filtrate is inactivated when both O2 and structural elements are present, but structural elements remain active in presence of O2. Filtrate separated from the structural elements in the absence of O2 is not inactivated by subsequent exposure to O2. The rate of oxidation of reduced ascorbic acid depends upon the quantity of structural elements, not on substrate conc. Destruction of dehydroascorbic acid takes place under both aerobic and anaerobic conditions but O2 stimulates the process and addition of filtrate aids it in either case. Reduced ascorbic acid is stable on boiling; dehydroascorbic acid is destroyed at 35°. The active factor in structural elements is thermostable to 55°, filtrate factor to 35°. Lettuce extracts destroy de-

The active factor in structural elements is thermostable to 55°, filtrate factor to 35°. Lettuce extracts destroy dehydroascorbic acid.—E. K. Johnson.

3089. REID, MARY ELIZABETH. The effect of light on the accumulation of ascorbic acid in young cowpea plants. Amer. Jour. Bot. 25(9): 701-711. 1 fig. 1938.—Seedlings of the Groit var. of cowpeas were grown in white sand and were kept at a temp. of 29° C,—some in darkness, others in light. Green weights were taken and ascorbic acid. others in light. Green weights were taken and ascorbic acid determinations were made daily from the time of planting. 7-day-old plants grown in light contained more than 4 times as much and 11-day-old plants about 9 times as much ascorbic acid as seedlings of corresponding ages grown in darkness. A rough parallelism was found between growth and ascorbic acid content of all organs both in light and in darkness. The quantity of ascorbic acid contained in seedlings grown in darkness increased up to the 4th day and decreased after the 5th day. Increase in green weight was rapid during the first 4 days, less rapid for the 3 following days, then declined. In light, growth and ascorbic acid increases were continuous during the first 14 days. Ascorbic acid accumulated in the cotyledons of germinating seedlings and was undoubtedly translocated to other organs both in light and in darkness. After the food reserves in the cotyledons were exhausted no further increase in ascorbic acid in seedlings grown in darkness was found. When additional carbohydrate in the form of glucose was supplied at the time when the reserves in the seedlings was nearing depletion an increase in the ascorbic acid content of the plants was found. Ascorbic acid formed in the mesophyll of the leaves was apparently translocated in part to other organs but a high concentration was maintained in the leaf tissues. Light appeared to be essential for the synthesis of a substance other than ascorbic acid which is concerned in the expansion of the blade. A higher content of ascorbic acid was found in the apex of the stem than in the lower portion. Fruits and vegetables, especially those of the leafy type, would according to these and other unpublished results tend to have lower vitamin C values than those developed under conditions of greater illumination.—M. E.

PIGMENTS

3090. FRIEDHEIM, ERNST A. H. Recherches sur la biochemie des champignons inférieurs. I. Isolement du pigment rouge de Penicillium phoeniceum (Phoenicine). Heluetica Chim. Acta 21(6): 1464-1465. 1938.—100 ml. of the culture medium, containing 3.5 g. of mycelium, yielded 44 mg of the pigment.—F. 4 McDownett.

culture medium, containing 3.5 g. of mycelium, yielded 44 mg. of the pigment.—F. A. McDermott.

3091. MIRIMANOFF, A., und A. RAFFY. Obtention de Flavine à partir d'un ascomycète. "Eremothecium Ashbyii." Helvetica Chim. Acta 21(5): 1004-1006. 1938.—340 g. of the culture contained 15.8 mg. of flavine, of which 6 mg. were recovered.—F. A. McDermott.

3092. SCHERTZ, FRANK MILTON. Isolation of chlorophyll, carotene, and xanthophyll by improved methods. Indust. and Engineer. Chem. 30(9): 1073-1075. 1 fig. 1938.—

A method of extracting carotene with petroleum ether, chlorophyll and xanthophyll with acetone with their subsequent separation is descr.—M. C. Moore.

ENZYMES

3094. RĚSNICHENKO, M. S., i N. P. KOZ'MĪNÄ. Ob otnoshenii děsagrēgiruūshchego bělok fěrmentä k okesliteliām. [The effect of oxidizing agents upon proteases.] [In Russ. with Eng. summ.] Biokhimiā [Biochem.] 3(3): 373-377. 1938.—The action of proteases of sprouted barley was not inhibited by oxidizing agents—H₂O₂, iodine, KMnO₄. The rate of gelatin degradation was the same with treated and untreated enzymes. In this the enzyme differed from plant proteinases of the papain type.—E. K. Johnson.

BIOELECTRIC EFFECTS

3095. BLINKS, L. R., M. L. DARSIE, Jr., and R. K. SKOW. Bioelectric potentials in halicystis. VII. The effects of low oxygen tension. Jour. Gen. Physiol. 22(2): 255-279. 1938.—The potential difference across the protoplasm of impaled cells of Halicystis is not affected by increase of oxygen tension in equilibrium with the sea water, nor by decrease down to about 1/10 its tension in the air. Low O. tension inhibits the reversed, negative P.D. produced by adding NH₄Cl to sea water, 0.2% O₂ bringing this P.D. back to the same low positive values found without ammonia. Restoration of 2% O₂, or air, restores this latent negativity. The locus of the P.D. alteration was tested by applying increased KCl cones. to the cell exterior; the large cusps produced in aerated solns. become greatly decreased when the P.D. has fallen in 0.2% O₂. This indicates that the originally high relative mobility or cone. of K⁺ ion has approached that of Na⁺ in the external protoplasmic surface under reduced O₂ tension. Results obtained with sulfate sea water indicate that Na⁺ mobility approaches that of SO₄ in 0.2% O₂. In addition to the surface changes there may be alterations in gradients of inorganic or organic ions within the protoplasm, but there is at present no evidence on this point. The surface changes are probably sufficient to account for the phenomena.—From auth. summ.

on this point. The surface changes are probably sufficient to account for the phenomena.—From auth. summ.

3095A. HILL, S. E., and W. J. V. OSTERHOUT. Calculations of bioelectric potentials. III. Variation in partition coefficients and ion mobilities. Proc. Nation. Acad. Sci. U. S. A. 24(8): 312-315. 1938.—The apparent mobilities of K^+ and Na^+ in the outer protoplasmic surface of Nitella can be calculated from changes in P.D. produced by changes of conc. Thus, the K effect (the change in P.D. produced by substituting 0.01M KCl for 0.01M NaCl) can be predicted by assuming a value for the ratio of partition coefficients $S_{\text{RCl}}/S_{\text{NaCl}}$ (S=conc. in the outer non-aqueous protoplasmic surface layer/conc. in the external soln.). In cells studied formerly it was assumed that $S_{\text{RCl}}/S_{\text{NaCl}} = 1$; in the cells used in the present investigation, we assume that $S_{\text{KCl}}/S_{\text{NaCl}} = 60$. Such variations in S do not appear improbable in view of exps. on models. In the cells studied earlier the apparent mobilities of K^+ and Na^+ differed from those found in the present investigation. This is not surprising as alterations of mobilities can be brought about by a variety of reagents and the apparent mobilities might therefore be expected to vary according to the metabolism of the cell.—Auth

of the cell.—Auth. summ.

3096. TIRELLI, M. Action de la connexion électrique avec le sol sur la germination de quelques plantes et sur le développement du ver à soie. Arch. Phys. Biol. et Chim. Phys. Corps Organ. 14(1/2): 98-106. 1937(rec'd 8-5-38).—The achenes of mulberry germinate more quickly when connected with the ground than when isolated from the ground; grains of corn, on the other hand, have germinated more quickly in the isolated condition, but when the plants were further developed, at the time of the appearance of chlorophyll, those connected to the ground were better developed than the others. The author believes this result is due to the difference in metabolism of the 2 stages of development. With Sinapis alba, germination and development have been much greater in the pots connected to the ground. Many exps. on the development of the silkworm have shown that isolated eggs are more favorable to the beginning of development but that in grounded eggs development can more easily continue to its termina-

tion, with fewer arrests in development. More than 20,000 eggs have been used in these experiments. When eggs were placed in Ag, Cu or Pb boxes a diversity of effects gave evidence to show an influence by the metal in contact. The life of the chrysalid and of the imago is apparently longer when isolated than when connected to the ground.—

P. L. Crummy.

TOXICITY

3097. BUXTON, B. R. Chlorinated water fatal to plants. Horticulture 16(21): 422, 1938.

POLARITY, GRADIENTS

3098. WHITAKER, D. M. The effect of pH on the development of ultra-centrifuged Fucus eggs. Proc. Nation. Acad. Sci. U. S. A. 24(2): 85-87. 1938.—Fertilized eggs of Fucus furcatus were stratified by ultra-centrifuging for 5 min. or longer at 150,000 and 200,000 × g. 100% of 396 such eggs reared each in a separate dish at 15°C in the dark in normal sea water at pH 7.9-8.1 formed rhizoids on the centrifugal halves of the eggs; 90% of 339 eggs reared instead in sea water acidified to pH 5.8-6.1 formed rhizoids on the centripetal halves of the eggs. The developmental response of the egg to the stratification is thus reversed with change in external pH.—D. M. Whitaker.

APPARATUS, METHODS

3099. ALTEN, F., E. RAUTERBERG, und E. KNIPPEN-BERG. Die Bestimmung verschiedener Stickstofffraktionen in der Pflanze unter besonderer Berücksichtigung des Alpha-aminosäure-stickstoffes. Bodenk. u. Pflanzenernähr. 8(5/6): 335-355. 1938.

3100. VARADARAJA IYENGAR, A. V. A preliminary study of the clarification of extracts for estimating sugars in plant materials. Jour. Indian Inst. Sci. 21A(2): 9-14. 1938.—A comparison was made using different methods to remove the coloring matter from extracts of cotton and sandal leaves. Basic lead acetate was the best reagent for the sandal leaf extract and neutral Pb acetate clarified the cotton leaf extract better than other treatments. Basic Pb acetate removed only about $\frac{1}{3}$ of the total N present in the original solution from the sandal leaves.—H. J. Harper.

PLANT CONSTITUENTS

3101. COMPTON, JACK. On the behavior of plant fibers dispersed in cuprammonium hydroxide solution. Contrib. Boyce Thompson Inst. 10(1): 57-70. 1938.—The successive lowering of the cuprammonium viscosity of native cottonseed fibers by the action of dilute acids or mild oxidizing agents is not accompanied by a change in the optical activity of the resulting dispersions. The optical activity of plant fiber dispersions in cuprammonium solutions is evidently dependent upon the formation of a cellulose particlecopper complex. Quantitative examination of variously treated plant fibers dispersed in cuprammonium solns., using the slit ultramicroscope, reveals the presence of approx. the theoretical number of cellulose particles $(1.1 \times 1.5 \ \mu)$. Further evidence that cellulose-copper compound formation precedes dispersion of cellulose in cuprammonium soln. is presented. Visible cellulose particles $(1.1 \times 1.5 \mu)$, observed by Farr and Eckerson in young cottonseed fiber cytoplasm and disintegrated mature cottonseed fibers, have now been observed in dispersions of plant fibers in cuprammonium soln. It is proposed that the behavior of plant fibers when dispersed in cuprammonium soln. is attributable to properties of the crystalline microscopic cellulose particle in conjunction with the intercrystalline fiber phase.—Auth. summ.

3102. FARR, WANDA K. Behavior of the cell membrane of the cotton fiber in cuprammonium hydroxide solution. Contrib. Boyce Thompson Inst. 10(1): 71-112. 1938.—The cellulose component of the cell membrane of the cotton fiber, which is in the form of diminutive cellulose particles,

does not dissolve in the standard soln. of cuprammonium hydroxide, specified by the Amer. Chem. Soc., to produce the viscosities commonly attributed to it. The fiber is transformed by the cuprammonium hydroxide into a swollen, viscous mass of cementing material in which the cellulose particles are dispersed. The separated cellulose particles from which the cementing material has been removed will not produce viscosities in cuprammonium hydroxide. One component of the cementing material, the pectic fraction extracted with ammonium oxalate, will produce viscosities in the same soln. to the point of formation of a stiff gel. These observations alter our previous conceptions of the behavior of both untreated and purified cell membranes in solutions of cuprammonium hydroxide. It is now clear that the viscosity-producing power of the cementing material, or of any one of its fractions, has been overlooked as has been also the presence in the cuprammonium solution of the cellulose in the form of diminutive particles of uniform size and shape, still undissolved, and merely in a state of dispersion.—Auth. summ.

3103. HARRIS, E. E., E. A. PARKER, E. C. SHERRARD, and G. L. CLARK. An x-ray study of lignin and its significance for the structure of living matter. Biodynamica 31. 1-12. 8 fig. 1938.—The position and the density of the X-ray diffraction lines and bands of 36 types of lignin prepared in the following various forms are described: H₂SO₄-lignin, methanol I., soluble I., methylated H₂SO₄-l., methylated methanol I., oxidized I., nitrated I, and sulphonic acid I. Well defined patterns were obtained with carbohydrate-free lignins from extractive-free woods. The spacings in the lattice were changed by the introduction of the methoxyl and nitro groups, but little change resulted from oxidation. The X-ray structure analysis of substances like lignin is suggested as a method of approach to the study of the molecular dynamics of such functions as secretion.—B. Luvet.

3104. SISSON, WAYNE A. Some observations upon the dispersion, electrokinetic and coagulation behavior of cotton fibers in cuprammonium hydroxide solution. Contrib. Boyce Thompson Inst. 10(1): 113-126. 1938.—Cotton fibers, when treated with electrolytically prepared cuprammonium hydroxide soln., swell and are disintegrated into small particles which disperse in the soln., as indicated by slit ultramicroscopic examinations. The particles exhibit Brownian movement, and possess a negative charge as indicated by their cataphoretic migration toward the anode. Upon removal of the cuprammonium cations by electrolysis the particles are coagulated to form a flocculent deposit. Microscopic examination shows the deposit to consist of uniformsized cellulose particles which give a mercerized X-ray diagram. The presence of particles in the deposited fiber material is attributed to a flocculation of colloidally dispersed crystalline particles rather than to the recrystallization of cellulose from a state of molecular dispersion in the cuprammonium hydroxide solution. It is tentatively suggested that the peptization and change in crystalline structure of the cellulose particle is associated with the formation of a swelling compound with cuprammonium solution.—Auth. summ.

MISCELLANEOUS

3105. MILLER, EDWIN C. Plant physiology with reference to the green plant. 2nd ed. xxxii + 1201p. 39 fig. McGraw-Hill Book Co., Inc.: New York, 1938. Pr. \$7.50.—Many topics have been revised and enlarged and a number of new ones have been added. Special effort has been made to include the results of pertinent American investigations. The questions at the end of each chapter in the 1st edition have been omitted in this. The bibliographies at the end of each chapter are very extensive. Author and subject indices are provided.—C. A. Kofoid.

PHYTOPATHOLOGY

FREEMAN WEISS, Editor

(See also in this issue Entries 1663, 1739, 1759, 1835, 2621, 2675, 2688, 2762, 2765, 2797, 2798, 2799, 2805, 2806, 2938, 2981, 2982, 2986, 2992, 3007, 3050, 3181, 3193, 3348)

DISEASES CAUSED BY FUNGI

3106. BANERJEE, S. The occurrence of Phytophthora parasitica Dast. on Caralluma (Boucerosia) diffusa Wight. Calcutta Univ. Jour. Dept. Sci. 1: 53-70. 1 pl. 1937.

3107. DUNEGAN, JOHN C. Germination experiments with over-wintered teliospores of Tranzschelia prunispinosae. Phytopath. 29(1): 72-78. 1 fig. 1939.—Germination exps. with overwintered teliospores of the discolor and typica vars. of Tranzschelia pruni-spinosae were performed at various times from 1924 to 1938. Teliospores of the discolor var. did not germinate in any of the tests but teliospores of the typica var. overwintered on fallen leaves of Prunus serotina germinated at various times from Feb. 11 to Apr. 6, 1938. Germination and basidiospore formation was more profuse when the teliospores were scattered over the surface of water agar in Petri dishes than when they were suspended in hanging drops of tap water. Only one promycelium was produced from each cell of the teliospore but both cells frequently germinated. The basidia are formed from the apical portion of the promycelia and produce hyaline, smooth-walled basidiospores $12.5-16\mu$ long and 5.5-6.5 wide. The results obtained in various exps. suggest that basidiospore production occurs outdoors under natural conditions during a period of several months in the spring.—J. C. Dunegan.

3108. GOLDSWORTHY, M. C., and M. A. SMITH. An apple leafspot associated with Fabraea maculata. *Phytopath.* 28(12): 938. 1938.—In addition to parasitizing leaves of pear seedlings F. m. was observed as causing similar leafspots on French crab and McIntosh apple scions grafted on various rootstocks.—M. C. Goldsworthy.

3109. JONES, FRED REUEL, and J. L. WEIMER. Stagonospora leaf spot and root rot of forage legumes. Jour. Agric.

Res. 57(11): 791-812. 3 fig. 1938.—A species of Stagonospora which has long been known to cause a leaf spot on spp. of Medicago, Melilotus and Trifolium, produces a root and crown rot of alfalfa (Medicago sativa) and rarely of sweet clover (Melilotus alba). In the roots of the host. rarely elsewhere, the mycelium is stained by the Gram method and is thus easily identified. This root rot of alfalfa has been found in Ohio, Wisconsin, and California. The fungus was isolated from the root rot and leaf spots on nearly all of the known host species and the cultures rostrum or beak of the pycnidium, the isolates from different hosts, with the exception of *T. pratense*, are considered as one morphological species with 2 imperiect stages. The fruiting form common to all of the hosts belongs to S. meliloti (Lasch.) Petr.; the other, found only on sweet clover in autumn, has been described as Phoma meliloti Allescher. The ascigerous stage, found thus far only on Melilotus alba and Medicago sativa, is Leptosphaeria pratensis. The Stagonospora on Trijolium pratense has one morphological character different from that on the other hosts studied and is regarded as a distinct species, Stagonospora recedens (Phleospora trifolii var. r. C. Massalongo) is suggested.—Authors.

3110. LOHWAG, KURT. Ganoderma resinaceum Boud., Erreger einer charakteristischen Fäule. Centralbl. Ges. Forstwesen 64(10): 258-260. 2 fig. 1938.—G. resinaceum, a wood-destroying fungus parasite of oak and several other broadleaf trees, rots away the wood and leaves only the medullary rays.—W. N. Sparhawk.

3111. MITRA, M., and P. R. MEHTA. Some leaf diseases

of Hevea brasiliensis new to India. Indian Jour. Agric. Sci. 8(2): 185-188. 1 col. pl. 1938.—Occurrence and symptoms of Gloeosporium alborubrum and Oidium heveae infections

are descr.

3112. RAY, W. WINFIELD. Overwintering of Taphrina robinsoniana. *Phytopath.* 28(12): 919-922. 1 fig. 1938.—This fungus causes hypertrophy of the bracts of \mathcal{L} catkins of Alms incana. No perennial mycelium was found in dormant catkins. Applications of lime-sulphur soln., as a dormant

spray, reduced the percentage of infection considerably. Female catkin-clusters enclosed in transparent, water-proof bags reached maturity without becoming infected. Results of cultural studies suggest that spores could remain viable in nature over winter. Perennial mycelium is apparently not a factor in the overwintering of this fungus. W. W. Ray.

3113. SHIH, L. Über den Heterothallismus des Staubfrandes, Sphacelotheca cruenta (Kuhn) Potter, der Mohrenhirse, Andropogon sorghum Brot. Arch. Microbiol. 9(2): 167-192. 1938.—After a brief history of the sorghum plant 167-192. 1935.—After a brief instory of the solgitum plant this article is devoted to a study of spore germination and sexuality in Sphacelotheca cruenta. Opt. temp. for germination was 28°-32°C, max. 38°, min. 8°. In well preserved material 100% of the spores germinated. There was no decrease after 2-3 yrs. Moist spores failed to germinate after 24 hrs. at 40°, and 10 days at 6°. In distilled water the spores germinated by hyphae directly at all temps.; in malt solns. by promycelia and sporidia. In other media there was a tendency toward hyphal production at higher temps., sporidial at lower. Potato glucose agar proved the best medium for growth of the fungus. Cardinal temps, were the same as for germination. The same conditions which favored hyphal germination favored hyphal growth in culture. Bauch's medium and technique were well adapted to the study of conjugation. Of the 119 single sporidia isolated 62 belonged to one group, 57 to the other. From an analysis of the 4 primary sporidia isolated from a single promycelium segregation for conjugation took place in the lst division, for cultural characters in the 2d. Hypodermic injections of the 4 monosporidial lines singly and in all possible combinations into plants 7 wks. old resulted in infection only when complementary lines were paired. Hypodermic injection of chlamydospores germinated in bouillon at 37° for hyphae, and in malt at 16° for sporidia, resulted in infection in both cases, the former giving a somewhat higher %. No infections resulted from inoculations with hyphal and sporidial cultures from monosporidial lines. When seedlings I cm. long were inoculated with germinating chlamydospores on the radicle, the hypocotyl (epicotyl) and the coleoptile, infection took place only through the hypocotyl if not wounded but through each of

the 3 regions if wounded.—L. Dosdall.

3114. THOMPSON, A. Observations on stem-rot of the oil palm. Dept. Agric. Straits Settlements and Fed. Malay States Sci. Ser. 21. 1-28. 15 pl. 1937(rec'd 3-23-38).—This disease of *Elaeis guineensis* is caused by *Fomes nozius* and has been known since 1927. The fungus is a facultative parasite which grows slowly during first year or year and a half. After that time it grows more rapidly. The disease is most severe on trees in deep peat or quartrite valley soil with sand beds near the surface. The burial of diseased palms is an efficient control because the fungus does not attack the roots, but Ganoderma lucidum which does attack roots may give trouble. Several other fungi of little or no importance are discussed in this paper.—M. T. Cook.

DISEASES CAUSED BY BACTERIA

3115. BURKHOLDER, WALTER H. A bacterial blight of stocks caused by Phytomonas syringae. Phytopath. 28(12): 935-936. 1938.—Phyt. syringae causes a leaf blight of stocks (Matthiola incana var. annua). The disease is similar in appearance to that caused by Phyt. matthiolae. The characteristics of the 2 pathogens in culture are similar and therefore *Phyt. matthiolae* is considered a synonym of *Phyt. syringae.*—W. H. Burkholder.

3116. METZGER, C. H. A new potato disease in Colorado. Amer. Potato Jour. 15(8): 225-230. 1938.—Early potatoes from the Olathe, Colo., district showed high %% of wet rot at harvest time in 1937, and much wet rot developed in transit. The tubers showed all stages of decomposition from a pale yellowish-brown discoloration of the vascular ring to a total decomposition of the medullary tissue. The cortex often remained unaffected. Prematurely dead vines produced badly decomposed tubers. Other plants wilted without discoloration except in a few basal leaves. Hills were frequently found with only I or 2 stems wilted, the others appearing normal. Cultures of stem end tuber tissue revealed a high infestation of bacteria. From the symptoms it appears that the disease may be Bacterial Wilt or Brown Rot (Bacterium solanacearum), or Bacterial Wilt and Rot as descr. by Bonde and by Savile and Racicot. Temps. at Olathe are favorable to the development of Brown Rot any year and do not account for the epidemic in 1937. Rainfall was below normal and the diseased plots at Olathe had been overirrigated. Similar disease symptoms were observed in the San Luis Valley, the Greeley district and the Carbondale district. The vars. showing symptoms were Triumph, Cobbler, Brown Beauty, Red McClure, Russet Burbank, and Katahdin.—C. H. Metzger.

317. WORMALD, H. Bacterial diseases of stone-fruit trees in Britain. XII. The organisms causing bacterial

3117. WORMALD, H. Bacterial diseases of stone-fruit trees in Britain. XII. The organisms causing bacterial diseases in sweet cherries. Jour. Pomol. and Hort. Sci. 16(3): 280-290. 1 fig. 1938.—The association of Pseudomonas prunicola and P. mors-prunorum with bacterial cankers on stems, branches and twigs, lesions on young shoots, dead buds, and leaf and fruit spots was established by isolation on plates of nutrient agar containing 5% saccharose, and infection of disease-free tissues with the disease, giving characteristic symptoms. The exp. was repeated several times. Broth cultures of P. prunicolum have a slight yellowish tinge and are translucent; broth cultures of P. mors-prunorum are white and opalescent. P. prunicola will live over 6 days, P. mors-prunorum less than 6 days, on nutrient agar with 5% saccharose. These organisms affect both prune and cherry but certain strains of each are more virulent on prune, other strains more virulent on sweet cherry.—E. L. Overholser.

VIRUS DISEASES

3118. ALLINGTON, W. B. The separation of plant viruses by chemical means. *Phytopath.* 28(12): 902-918. 3 fig. 1938.—Unpurified plant virus extracts were treated with various chemicals for 1 hour at 20-22° C, then diluted and inoculated to tobacco by the rubbing method. The approximate relative concs. of each chemical necessary to completely inactivate each of several viruses was first determined. Although viruses could be grouped to a limited extent by their general tolerance to chemicals, chemicals were in many cases specific in their action. By virtue of this type of specific action, the components of 4 virus mixtures were repeatedly isolated. E.g., the ordinary cucumber-mosaic virus is more tolerant to HgCl₂ and AgNO₂ than the potato ring-spot virus, but less tolerant to CuSO4, KMnO4 or Li2CO2 than the potato ring-spot virus. Hence, treatment of the virus mixture with the proper chemical agent destroyed one virus without eliminating the other. permitting the isolation of each component of the mixture. Other virus mixtures which were repeatedly separated were: potato ring-spot virus + potato veinbanding virus, tobacco ring-spot virus + ordinary cucumber-mosaic virus, and ordinary tobacco-mosaic virus + tobacco ring-spot virus.— W. B. Allington.

3119. BLACK, L. M. Properties of the potato yellow-dwarf virus. Phytopath. 28(12): 863-874. 2 fig. 1938.—The potato yellow-dwarf virus, carried by the clover leafhopper, is difficult to transmit mechanically on potatoes or on clover, 2 of its important hosts. The pin-puncture method of inoculating these plants was superior to the carborundum method but gave, at the best, only 50% infection. A number of new hosts of the virus are reported. On one of these, Nicotiana rustica, the virus produces numerous primary lesions when leaves are inoculated by the carborundum method. By the use of this primary lesion reaction it was detd. that the virus is inactivated at room temp. in 2½-12 hours, and is destroyed at 50° C in 10 min. It does not remain viable in dried leaves, has a dilution end-point of 10-8 to 10-8 and will pass through a Berkefeld W. filter.—L. M. Black.

3120. BLODGETT, F. M. The spread of apple mosaic. *Phytopath*. 28(12): 937-938. 1938.—Evidence is presented of a slow spread of apple mosaic or variegation on apple,

Pyrus malus, which amounts to 51.4% in one 5-year period and 69.8 in another. There were indications that it followed the direction taken in pruning.—F. M. Blodgett.

3121. COCHRAN, L. C., and LEE M. HUTCHINS. Further studies on host relationships of peach mosaic in southern California. *Phytopath.* 28(12): 890-892.1 fig. 1938.—Mosaics of almond, apricot, plum, and prune occurring naturally in southern California produced peach mosaic-like symptoms in peach after graft inoculations. When healthy almond, apricot, plum, and prune nursery trees were inoculated with typical peach mosaic from a commercial orchard, no symptoms developed after the normal incubation period for peach mosaic in peach, yet indexing with healthy peach scions showed that the trees had been invaded by the virus. Almond, apricot, and prune mosaics were transmitted from diseased to healthy trees, and apricot mosaic symptoms were induced in apricot trees inoculated with almond mosaic. Apricot mosaic passed through peach trees produced typical symptoms when returned to apricot trees. Surveys of old French prune orchards contiguous to mosaicaffected apricot and almond orchards showed 1-2% mosaicaffected trees. Surveys of prune and plum orchards contiguous to peach mosaic infected peach orchards, in the absence of apricots and almonds, revealed no mosaicinfected trees. Indexing of these plum and prune trees showed them to be free of peach mosaic. While this evidence indicates the existence of more than one mosaic-producing virus in stone fruits in southern California the similarity of symptoms and coördination of occurrence show the need of further experimentation before definite conclusions can be drawn.—L. C. Cochran.

3122. DUFRENOY, J. Les conceptions actuelles sur les virus du tabac. Ann. Epiphyties et Phytogénétique 4(2): 267-279. 7 fig. 1938.—A discussion of some physico-chemical, biochemical and cytological aspects of virus diseases of tobacco.—W. V. L.

3123. DYKSTRA, T. P. A study of viruses infecting European and American varieties of the potato, Solanum tuberosum. Phytopath. 29(1): 40-66.7 fig. 1939.—The chief symptoms, as found on different American and European potato vars. and certain other solanaceous plants are descr. for the following viruses: mild mosaic, crinkle mosaic, crinkle, leaf-rolling mosaic, and para crinkle, and the vein banding, Y, stipple streak, X, top-necrosis B, and top-necrosis C viruses. Mild mosaic, crinkle mosaic, and crinkle, although not identical, were found to be so similar that the virus in the complex in addition to X, is designated as virus A. Leaf rolling mosaic was found to be distinct from para crinkle. Vein banding, Y, and stipple streak viruses were found to be closely related strains of the same virus, and all 3 are included under virus Y. No relationship was found between the vein banding and the cucumber mosaic virus. Amaranthus retroflexus proved to be a host of virus X. Virus B produced top necrosis in the varieties Arran Victory and President. Green Mountain was found to be normally a symtomless carrier of the virus in addition to virus X. Virus C causes top necrosis, as a current-season symptom in all of the American potato vars. tested.—T. P. Daukstra

3124. ESAU, KATHERINE. Some anatomical aspects of plant virus disease problems. Bot. Rev. 4(10): 548-579. 1938.—Review of nature of induced anatomical modifications, histology of hosts and virus classification, anatomical aspects of plant-tissue relation of viruses, and induced phloem abnormalities.—L. Benson.

3125. LAUFFER, MAX A. The viscosity of tobacco mosaic virus protein solutions. Jour. Biol. Chem. 126(2): 443-453. 1938.—From measurements of the specific viscosity of tobacco mosaic virus protein solus. used in conjunction with sedimentation data taken from the literature, the size and shape of the tobacco mosaic virus protein molecule were estimated. Two alternate sets of values are obtained: one corresponded to rod-like particles having a mol. wt. of $42.6 \times 10^{\circ}$, a diam. of 12.3 m μ , and a length of 430 m μ ; the other corresponded to rod-like particles with a mol. wt. of $63.2 \times 10^{\circ}$, a diam. of 11.5 m μ , and a length of 725 m μ . On the basis of an arbitrarily chosen model having as dimensions the first set of values, it was shown that prepns. of the protein which show a double

boundary in the ultracentrifuge are probably composed of molecules plus particles formed by an end-to-end association of 2 molecules. Both viscosity and double refraction of flow increase in the region of the isoelectric point, but only the viscosity falls sharply to a minimum very near the isoelectric point. This behavior is probably due to the end-to-end association of rod-like molecules, followed by the side-to-side association of the long rods as one approaches the isoelectric point from either side. The viscosity decreased upon the addition of electrolytes, an effect probably due to the electrokinetic potential of the particles.—M. A. Lauffer.

3126. LORING, HUBERT S. Properties of the latent mosaic virus protein. *Jour. Biol. Chem.* 126(2): 455-478. 1 fig. 1938.—The yields and specific activity of latent mosaic virus prepd. by chem. treatment and by ultracentrifugation at low temps. were detd. Repeated precipitation with salt or acids produced prepns. of low, varying activity; virus obtained by ultracentrifugation possessed a uniform, high activity. Analyses of the latter preparations are those of a nucleoprotein containing about 6% nucleic acid. The ratio of carbohydrate to P suggests that other carbohydrates besides that combined as nucleic acid may be present. The latent mosaic virus is unstable below pH 4 or above pH 9, but is stable within this range. Latent mosaic virus purified by ultracentrifugation is evidently essentially the same as

3127. NEURATH, HANS, and ARTHUR M. SAUM. The diffusion of tobacco mosaic virus protein in aqueous solution. Jour. Biol. Chem. 126(2): 435-442. 1938.—The diffusion four. Biol. Chem. 126(2): 435-442. 1938.—The diffusion constant of tobacco mosaic virus protein, prepared by the themical method of Stanley, was found by Lamm's refractometric diffusion method to be 3×10^{-8} sq. cm. per sec. in the most dilute solns. From this value and the sedimentation constant of 174×10^{-18} the mol. wt. was calculated to be about 59,000,000. Using the sedimentation constant of 200×10^{-33} , the mol. wt. would be about 64,800,000. This would correspond to a particle of about 14 ma in diam and 700 ma in length. The physical meaning 14 ma in diam. and 720 ma in length. The physical meaning of these values in relation to those reported in the literature

that present in the infectious juice.—H. S. Loring.

is discussed.—Authors. 3128. OSBORN, H. T. Studies on pea virus 1. Phytopath. 28(12): 923-934. 1 fig. 1938.—Although pea virus 1 is difficult to transmit to Vicia jaba plants by the ordinary rubbing methods, it is transmissible by the carborundum-powder method. Sub-inoculation from mechanically inoculated plants was found to be more difficult than from plants inoculated by colonies of aphids. The virus was recovered from infected plants as soon as 3 days after inoculation by colonies of pea aphids [Macrosiphum pisi]. Sub-inocula-tion from mechanically inoculated plants usually failed if made within less than 24 days after inoculation and in many plants after much longer periods of time. Sub-inoculation from aphid-inoculated plants failed in some cases. The virus was carried through 4 serial passages by mechanical inoculation in V. faba. Sub-inoculation appeared to be even more difficult after several serial passages by mechanical inoculation in V. faba. The virus was infective after heating in vitro for 10 min. at various temps. up to 64° C, but was not infective after heating to 66° C. It was infective after aging in vitro for periods up to 4 days, but was not infective after 5 days' aging. It was infective after dilution to 10⁻⁴ but not after dilution to 10⁻⁴. Aphids retained the virus for periods up to 8 days when they were removed from diseased plants and transferred to a suc-cession of healthy plants that were held in a room at 35° C. Failure of aphids to infect plants after being held for periods longer than 8 days at 35° C may have been due to the loss of infective individuals in the colonies when held at this temp. 2 strains of pea virus 1 are described. These differ in symptoms and in ease of transmission by mechanical means.—H. T. Osborn.

3129. PRICE, W. C., and RALPH W. G. WYCKOFF. Ultracentrifugation of juices from plants affected by tobacco necrosis. *Phytopath.* 29(1): 83-94. 4 fig. 1939.— Characteristic macromolecular substances that sedimented with a single sharp boundary and a sedimentation constant of $S_{20} = \text{ca. } 112 \times 10^{-18}$ cm. sec. dynes were obtained by quantity ultracentrifugation from Turkish tobacco (*Nico-* tiana tabacum), cucumber (Cucumis sativus), cowpea (Vigna sinensis), and Nicotiana glutinosa plants infected with tobacco-necrosis virus. The amounts obtained were roughly proportional to the infectiousness of the source plant juices. Purified solns, of the material from tobacco plants were considerably more infectious than the original juice when the dilution end points were used for comparison but only slightly, if at all, more infectious when undiluted solns. were compared. For this reason, and because of the possibility that inhibiting substances might be present in the juices of diseased plants, it could not be concluded definitely -although it seems probable—that virus activity was concentrated by the ultracentrifugal procedure employed. The infectious juices from diseased cucumber and cowpea plants contain lighter components that probably are the same as the pigmented macromolecular substances present in considerable amounts in healthy plants of the same spp. Small amts, of similar non-infectious macromolecular substances were found in healthy Turkish tobacco and N. glutinosa plants. All these substances, except that of cowpea, sedimented with a constant of S_{20} = ca. 75×10^{-13} cm. sec. dynes 1. That of cowpea sedimented with S_{20} = 51 \times 10 -13.— Auth. summ.

3130. ROSS, FRANK A., and W. M. STANLEY. The partial reactivation of formolized tobacco mosaic virus protein. Jour. Gen. Physiol. 22(2): 165-191. 5 fig. 1938.—A marked reactivation of tobacco mosaic virus protein that has been partially or completely inactivated by formaldehyde was obtained by dialysis at pH 3. The activity of partially inactivated virus proteins was generally increased about 10-fold by the reactivation process. It was also found possible to reactivate completely inactive preprise. to an appreciable extent. Inactivation and the subsequent reactivation cannot be explained by the toxicity of the formaldehyde or of the formolized protein or by aggrega-tion. Inactivation was accompanied by a decrease in amino groups as indicated by Van Slyke gasometric determina-tions and by colorimetric estimations using ninhydrin. Inactivation also decreased the number of groups that react with Folin's reagent at pH 7.7. The latter are probably the indole nuclei of tryptophane, for tryptophane, glycyltryptophane and indole propionic acid react with formaldehyde in a similar manner, while tyrosine and glycyltyrosine do not. Evidence that reactivation is accompanied by an increase in amino N and in groups that react with Folin's reagent was obtained by colorimetric estimation.-From auth. summ.

3131. SALAMAN, R. N. The potato virus "X": its strains and reactions. Phil. Trans. Roy. Soc. London Ser. B 229(559): 137-217. 8 pl., 47 fig. 1938.—Six strains of the X virus (also known as the common mosaic of Quanjer, the healthy potato virus of Johnson, and potato virus I of Smith) of potato are descr. as to the disease symptoms caused on 21 spp. of plants and in some cases as especially on Solanum tuberosum on a number of vars. The mildest strain, Xⁿ, is carried without symptoms by most vars. of potatoes and many other differential hosts but can be detected in pepper and by the fact that inoculation with this strain affords protection from all of the other strains of X virus. The strains X^G and X^L can be identified on tobacco and *Datura*. The strains X^G and X^D behave similarly on the above plants, but quite differently on President, Arran Victory, Majestic and some other vars. of potatoes. The strains X^s and Xⁿ may be distinguished by tests on potatoes but more quickly on Hyoscyamus and tomato. Strains X^D and X^N may be distinguished on tobacco, Datura, pepper, Hyoscyamus, tomato and potatoes. When tobacco or Datura were inoculated with these strains of X virus each separately, inclusion or X bodies of the same character were found in all. The size of the inclusion body was commonly greater than the nucleus. They were granular, deeply staining and some had vacuoles. There was a slight difference in the localization of these bodies in tobacco to Datura. Potatoes taken from the field and examined, frequently showed mixtures of these strains of X virus. All of the 6 strains of X virus induce precipitin and neutralization reactions with anti-X° or anti-X° rabbit serum. The physical characters so far detd. for strains of the X virus are very similar, the longevity in raw juice

ranged from 4 to 5 months, the thermal death point from fanged from X to motions, the thermal death point from 1-3000 for X^{H} to 1-100,000 for X^{N} , and particle size is reported as 113 m μ for all strains. Most of the separations of strains originally mixed were made by punching out areas of different color from infected leaves with a punch about 1 mm in diam. to obtain material to be used as inoculum. Sometimes this was preceded by inoculation with diluted mixtures in order to obtain local lesions of different strains. When various strains of X virus were mixed in vitro before inoculation, the milder strain, if present in large enough proportion, would protect the plant from the more virulent strains, thus X⁶ and X^L in proportions of 9:1 or greater, gave only symptoms of the milder X⁶ strain. Mixtures of Y virus and various strains of X when used to infect tobacco gave rise to diseases of different severity roughly proportional to the severity of symptoms with the different strains of X virus used in the mixture. Even the mildest strains of X virus combined with the masked, common or aucuba strains of tobacco mosaic produced necrotic local lesions on tobacco though such lesions are not produced by Xⁿ, H^q, Xⁿ or any of the above strains of tobacco mosaic operating alone. Studies on the conversion of one strain to another led to the recognition of the following types of behavior: (a) On a single host in constant condition sudden change of strain is rare. (b) In the majority of cases where change has taken place it could be traced to methods of treating the inoculum. (c) Passage of the X virus through solanaceous hosts other than certain potatoes has failed to bring about change. (d) Passages through horse bean and beet have effected an immediate change of type of virulence. (e) Conversion was affected in vitro by mixing X⁸ in tobacco juice with juice of healthy beet. (f) Every example of strain conversion occurring spontaneously or artificially induced has been from a higher to a lower virulence. The completeness of acquired immunity induced by inoculating plants with strains that produce slight symptoms or none varies with the kind of plant and its growing conditions. In the winter with low sunlight or temp, the protection is more apt to be incomplete. A longer period is required with Datura spp. and Nicotiana glutinosa for the immunity to become complete than with N. tabacum. Of 60 potato varieties from Peru, 50 were found to contain weak strains of X virus. U.S.D.A. seedling 41956 is reported to be completely immune to all strains of X virus. Reasons are presented for believing that the X virus molecule may be furnished with various combinations of radicals accounting for the behavior of the several strains, as follows,—radical A, attacking virus to plant protoplast and specific for virus X; radical M, inducing non-necrotic mottle in tobacco plants; radical N, inducing necrotic lesions in tobacco plants; radical P, inducing necrotic foliar lesions in potato; and radical C, uniting with a radical present in each of 3 strains of tobacco mosaic to cause a distinct and lightly necrotic mottle in tobacco.—F. M. Blodgett.

3132. SEVERIN, HENRY H. P., and JULIUS H. FREITAG. Western celery mosaic. Hilgardia 11(9): 493-558. 8

pl., 9 fig. 1938.—The host range of western celery mosaic is limited to the Umbelliferae. The following economic plants have been found naturally infected: vars. of celery (Apium graveolens var. dulce), celeriac (A. g. var. rapaceum), and carrot (Daucus carota var. sativa). The virus passes through all grades of Chamberland filters. It is inactivated by 10min. exposure at 60° C. Freezing juice extracted from naturally infected celery kept in cold storage at -18° C does not inactivate it in 18 months. The tolerance to dilution of extracted diseased celery juice is 1:4,000. Inactivation of the virus occurs when extracted diseased celery juice is exposed to the air at room temp. for a week. The virus in the supernatant liquid withstands treatment with 30% alcohol and the precipitate with 40% alcohol for 1 hour. 6 spp. of aphids which have not been found to breed on celery under field conditions, and 11 spp. of aphids which breed on celery under natural conditions, transmitted the virus; there is no specific aphid vector. The highest percentage of infections by single winged aphids was 7 produced by the celery-leaf aphid (A. apigraveolens) and by single wingless mature aphids 37.3%, produced by the rusty-banded aphid (A. ferruginea-striata). Retention

of the virus by single infective wingless aphids varied from 1 to 8 hours and by lots of 20 infective aphids from 1 to 10 hours. In some instances aphids recovered the virus from celery infected with western celery mosaic before symptoms of the disease developed, in some on the same day after the earliest symptoms of the disease appeared and in others in from 1 to 6 days after the first symptom of the disease developed.—H. H. P. Severin.

3133. THUNG, T. H. Smetstof en plantencel bij enkele virusziekten van de tabaksplant. IV. [The infective principle and the plant cell in some virus diseases of tobacco. IV.] Tijdschr. Plantenziekten 44(5): 225-246. 4 pl. 1938.— Eng. summ.—Two recently discovered mosaic diseases of the white mosaic type, designated as mosaic virus VIb and VIc, are descr. Both are of the slow-moving type, as is also the Rotterdam-B disease of Jochem. The symptoms of the mosaic caused by virus VIb can be differentiated on the older leaves in 4 different areas, viz., dark green, light green, white and necrotic. Sap from the white areas has the highest infectivity and virulence. As the white areas of the older leaves are the same parts as the light green areas of the younger leaves, it is concluded that during the outgrowth a considerable multiplication of the virus takes place. In the oldest leaves the white areas become necrotic accompanied by a slowly decreasing infectivity of the sap. The symptoms of the mosaic caused by virus VIc consist only of white spots on the older leaves; the young leaves appear entirely healthy. Only the white spots yield infective sap. Plants affected with Jochem's Rotterdam-B disease also have areas on the young leaves devoid of infective sap; the older leaves are invaded throughout. Inoculation expts. with virus VIb, and the virus of Rotterdam-B disease as well as with one of the following viruses: ordinary mosaic, white mosaic (VIa), severe mosaic, ring spot necrosis, Holmes' distorting strain were carried out on the same plant under various conditions. The results are descr. in detail. Domination of 1 or more of the viruses was often found. The virus of Rotterdam-B disease is stronger than the other viruses, but the movement is too slow to effect complete domination even when inoculated into plants having mosaic VIb. The following general conclusion is reached: Some infective principles decrease and spread slowly. If at the same time a faster infective principle is present, the slow ones reach the growing points too late to affect the newly formed leaves. The "virulence" of the infective principle is not correlated with the velocity of spread. The possibility of binding of come infective principles with the velocity of spread. some infective principles with each other is suggested. H. L. G. de Bruyn.

NON-PARASITIC DISEASES

3134. GEMMELL, ALAN R. The degeneration of Metropolitan bent. Phytopath. 29(1): 95-102. 4 fig. 1939.—A disease of Metropolitan bent golf greens in Minnesota, characterized by a general dying of the grass, save for a few lighter green plants, is attributed to the deficiency of a minor element or elements in the soil. This finding is based on an inability to isolate any causal organism or to remedy the condition by the application of fungicides or by cultural practise, and on a comparison of the morphology of resistant and of susceptible strains of bent, i.e., Agrostis stolonifera.—A. R. Gemmell.

3135. WADLEIGH, CECIL H., and JOHN W. SHIVE. A microchemical study of the effects of boron deficiency in cotton seedlings. Soil Sci. 47(1): 33-36. 1938.—The development of B deficiency symptoms in cotton seedlings was followed microchemically. As the symptoms increased in severity, scattered cells throughout the tissues of the stem tips became much more acid than the normal cells of these tissues. Ammonium N accumulated, especially in the more acid cells, although no ammonium N was supplied to these plants. Sugars accumulated. Protein tests indicated a progressive degeneracy of the protoplasm. In the absence of B the course of protein synthesis seems to be altered.—Auth. summ.

PARASITISM AND RESISTANCE

3136. ALLEN, PAUL J., and DAVID R. GODDARD. Changes in wheat metabolism caused by powdery mildew.

Science 88(2278): 192-193. 1938.—The pathogenesis of Erysiphe graminis tritici infection of wheat was correlated with an increase in fermentation and a larger increase in respiration of the host tissue, these changes occurring in the green cells of the mesophyll not in contact with or invaded by the fungus hyphae. Preliminary measurements indicated that the destruction of functional chlorophyll is subsequent to these other metabolic changes.-F. V. Rand

(courtesy Exp. Sta. Rec.)

3137. ANDERSON, OLOF CAMPBELL. A cytological study of resistance of Viking currant to infection by Cronartium ribicola. Phytopath. 29(1): 26-40. 2 fig. 1939.—Leaves of highly-resistant Viking, a Norwegian Red Dutch currant of unknown origin but probably in part derived from R. petraeum, were compared with those of 3 susceptible Ribes (R. nigrum, R. sativum hybrid var., American Red Dutch and G. hirtella), all of which were similarly inoculated during 2 years with C. ribicola. Cytological investigation revealed that infection occurred through the stomata in young unhardened Viking leaves, but the resulting sparse hyphae died before the parasite could devlop or produce spores. The brief presence of hyphae in immature leaf tissue caused necrotic flecks subsequent to the death and disappearance of the rust mycelia. Mature hardened leaves usually failed to show these evidences of infection, although germ tubes penetrated the leaves via the stomata. The blister rust fungus similarly entered the stomata of the susceptibles and, after abundant development, the parasite produced fruiting bodies. Viking resistance appears to be physiological rather than physical, as the leaves did not differ in gross anatomy from the 3 susceptibles in which fertile uredinia readily formed. These new data substantiate previous studies which demonstrated the high resistance

of Viking to blister rust.—O. C. Anderson.

3138. BEVER, WAYNE M. Reaction of wheat, barley, and rye varieties to stripe rust in the Pacific Northwest. U. S. Dept. Agric. Circ. 501. 1-14. 1938.—A total of 317 vars. of wheat grown in the U.S. and 1,284 foreign introductions, including common, club, durum, emmer, poulard, and Polish wheats, 365 vars. of barley, and 11 vars. of rye were studied for their reactions to stripe rust (Puccinia glumarum) in the field and in the greenhouse. Greenhouse tests were limited to seedling reactions; in the field the rust readings were made when the plants were in the soft-dough stage of maturity. Inoculum used for the greenhouse test consisted of physiologic race 19; infection under field conditions was from natural infection. Of the commercial winter wheat vars., Blackhull, Cheyenne, Kanred, Oro, Ridit, and Turkey (C.I. 6175) of the hard red winter class; and Fulhio, Nittany, and Red Rock of the soft red winter class were the most resistant. The Defiance, Dicklow, and Irwin Dicklow white spring wheats and the Democrat, Hard Federation X Martin, and Red selection (C.I. 11689) white winter vars. were resistant. The club wheats were the most susceptible as a class, only Big Club showing resistance in both the seedling and soft-dough stages. Kubanka, Mindum, and Monad were the only durum vars, that were susceptible in the field. Mondak and Nodak were susceptible in the seedling stage. About half of the 365 vars, of barley studied in the greenhouse had an immune type of reaction. Winter Club, Hannchen (C.I. 602), Meloy, Horsford, and Wisconsin Pedigree 38 were resistant in the field. None of the 11 vars. of rye was completely susceptible. The Prolific spring var. was the most susceptible under both greenhouse and field conditions.—W. M. Bever.

3139. GARREN, KENNETH H. Studies on Polyporous abletinus. II. The utilization of cellulose and lignin by the fungus. Phytopath. 28(12): 875-878. 1938.—P. abietinus, when grown on a medium containing either cellulose or lignin as the only organic source of nutrition, can utilize either of these materials. Cellulose is a better source of When coniferous sapwood is decayed by P. nutrition. abietimus both the cellulose and lignin are destroyed. Nitrogenous materials stimulate growth of the fungus on a lignin medium, but not on a cellulose medium. When grown on a medium containing tannic acid the fungus forms a brown halo, indicating the formation of laccase. The lacease also probably catalyzes the oxidation of the phenolic groups in lignin, hence causing a partial decomposition of the lignin.—K. H. Garren.

3140. GARRETT, S. D. Soil conditions and the root-infecting fungi. Biol. Rev. Cambridge Philos. Soc. 13(2): 159-185. 1938.—This is a review of papers published during the past 15 yrs. (with a bibliography of about 3½ p.) on soilborne fungus diseases of plants, with special reference to the influence of soil conditions on infection.—F. V. Rand (courtesy Exp. Sta. Rec.).

3141. McNEW, GEORGE L. Differential reaction of apple varieties to Gymnosporangium juniperi-virginianae. Iowa Agric. Exp. Sta. Res. Bull. 245. 113-142. 6 fig. 1938.—G. igniperi-virginianae was collected from red cedars in States and in 49 localities in Iowa during 1933 and 1935 and tested for virulence Most collections produced aecia on Bechtel's Crab, Wealthy, Jonathan and Rome Beauty, flecks with or without pycnia on York Imperial, Tolman, Ben Davis, Maiden Blush, Oldenburg, Turley and Grimes Golden, and flecks on Delicious and Northwestern Greening. 8 classes were identified by the atypical reaction of certain of the apple vars. At least 4 of these are considered to be parasitic races but they are not so designated because be parasitic faces but they are not so designated because it was not possible to repeat the tests with the rust which has no autoecious cycle. Collections of the 1st class pro-duced aecia on Tolman and York Imperial; the 2d produced atypical diffuse flecks on York Imperial and defoliated Jonathan after producing large aecial sori; the 3d failed to infect Delicious and Northwestern Greening; and the 4th defoliated Turley after producing pycnia. Histological studies revealed certain differences in the host-parasite relationships that might account for some of the differential reactions observed.—G. L. McNew.

3142. PINCKARD, J. A., and LUTHER SHAW. Downy mildew infection of flue-cured tobacco in the field. Phytopath. 29(1): 79-83. 4 fig. 1939.—The symptoms of downy mildew of flue-cured tobacco, caused by Peronospora tabacina, on field grown plants, are descr. as being (1) small necrotic spots, usually grouped, giving a blotched effect or (2) chlorotic areas with indefinite margins which may later necrose and fall from the leaf. Meteorological conditions attending the field epidemic are given. Sources of inoculum for field infection are thought to arise from infected seed

beds.-J. A. Pinckard.

3143. ROSEN, H. R., and L. M. WEETMAN. The 1938 crown rust epidemic of oats in Arkansas in relation to hybrids of Bond and Victoria. Phytopath. 28(12): 898-901. 1 fig. 1938.—Puccinia coronata avenae, very recently described from Minnesota and now found in Arkansas, was identified in 25 out of 153 collections made in 1937. Unlike race 1, which is usually prevalent in Arkansas, this new race produces a fully susceptible reaction on Bond and its hybrids in the greenhouse. In the field, in the presence of the very severe epidemic of crown rust of 1938, this race was present in insignificant amounts. Compared with race 1, which was responsible for much chlorotic and necrotic spotting of leaves of Victoria and its hybrids, the new race on Bond and its hybrids offered no serious handicap in breeding for crown rust resistance. Two theories are presented to explain the difference in behavior of Bond and its hybrids reacting to the new race in the field compared with the greenhouse: the new race appears in the field considerably later than race 1; and the reactions may be comparable to vars. of Red Rustproof oats which are also highly susceptible in the greenhouse but are largely rust-escaping in the field.—H. R. Rosen.

DISEASE CONTROL

3144. BURGER, F. W. Iepensterfte in Nederland. [Death of elms in the Netherlands.] *Tijdschr. Plantenziekten* 44 (4): 177-206. 5 pl. 1938.—The legal regulations issued after 1930 are given in detail. Data as to the numbers of elms present now and destroyed during the last years are given for the different parts of the Netherlands separately. In 1936, 930,000 elm trees were present in the whole country; in the last 6 years 1 of all the elm trees have been destroyed, 75% of which was due to the elm disease. The difference in number of destroyed trees belonging to the state and to public institutions or to private property is striking, proving that the preventive methods better and regularly executed by the state are of great importance in retarding the spread of the disease. The different % of

loss in various part of the country indicates that in Noord-Holland the disease spreads much slower than in other parts. In Groningen it was evident that the disease was less in trees growing in clay than in sand or peat. Trees growing along roads were attacked least, the less favorable conditions for their growth apparently preventing a heavy attack by beetles. The careful removal of dead trees to prevent the multiplication of beetles resulted in less spread of the disease in recent years in certain areas, the influence of omitting of this measure for 1 year was also observed.—

H. L. G. de Bruyn.

3145. COLE, J. R., and J. R. LARGE. Results of three years' spraying with low lime bordeaux mixture for the control of pecan scab. Peanut Jour. and Nut World 17 (6): 26, 27. 1938.—The results reported are said to indicate that 1 prepollination spray application of bordeaux mixture (2-0.5-50) soon after foliation begins, followed by 3 applications (3-1-50) at intervals of 3-4 weeks, will control Cladosporium effusum infection. The importance of sanitary measures is also stressed. A correlation was found between infection and rainfall, the greatest infection occurring during periods of heaviest rainfall, especially when the rains occur in late afternoons or evenings.—F. V. Rand

(courtesy Exp. Sta. Rec.).

3146. DEGMAN, E. S., L. P. BATJER, L. O. REGEIMBAL, and J. R. MAGNESS. Further investigations on the use of boron for control of internal cork of apples. Proc. Amer. Soc. Hort. Sci. 35: 165-168. 1937(1938).—Excellent control of internal cork of Ben Davis apple was obtained by spring or fall soil application of \$\frac{2}{3}\$ to 1 pound of borax or boric acid per tree. Injection of H₂BO₃ with 3 holes per tree-trunk gave incomplete control, ascribed to incomplete distribution of the chemical. Injection, with 2 holes per large branch, was effective. Spring soil application of 5 lbs. ZnSO₄ or 10 lbs. sulphur, or injection of ZnSO₄, was ineffective. Although drouth or irregular rainfall may aggravate internal cork on limestone soils, none has been observed in this region on soils derived from shale or sandstone despite frequent moisture shortage in the trees

they support.—A. B. Burrell.

3147. ELLENWOOD, C. W. Some relationships between the bloom period and spraying dates. Ohio State Bimonthly Bull. 191. 63-66. 1938.—Based on 10 years' observations on 12 vars. of apples representing early, midseason, and late-blooming kinds, the average length of the period between the date of first bloom and the beginning of full bloom was 6 days. The average length of time from the application of the 1st prebloom or scab spray until the beginning of full bloom was 20 days, with the shortest period 11 and the longest 30 days. Among the 12 apples, Oldenburg was earliest to bloom, and Rome Beauty, Northern Spy, and Golden Delicious were late-blooming. Between the earliest and latest varieties there was an average difference of 8 days in the appearance of the first blooms during the 10 years.—J. W. Wellington (courtesy Exp. Sta. Rec.).

3148. FAULL, J. H. The Dutch elm disease situation in the United States at the close of 1938. I-III. Harvard Univ. Arnold Arboretum Bull. Pop. Information 6(13): 75-78. 1 pl. 1938.

3149. FIKRY, AMIN. The control of peach mildew. Min. Agric. Egypt Tech. and Sci. Serv. Bull. 183. 1-14. 7 pl. (1 col.) 1937(rec'd 11-29-38).—Home made lime sulphur (1:10), commercial lime sulphur (1:200) and Amberene (1 or 2:1000), a proprietary Na polysulphide preparation, were used in spray experiments for the control of peach mildew (Sphaerotheca pannosa var. persicae) a disease prevalent in the peach orchards of both lower and upper Egypt. By spraying with these compounds as soon as the disease appeared in the orchards, followed by 2 additional applications at intervals of 3 weeks, the author obtained complete control of the disease and reduced losses from it to a minimum, while 90-100% of the fruit on non sprayed trees was affected, resulting in serious financial losses to the growers as well as a marked devitalization of the trees through the attacks of the fungus on the leaves and shoots. The addition of soap (0.2 to 0.5%) as a spreader in the first application increased the efficiency of the sprays in controlling the disease on the fruit. Although the disease has been observed throughout Egypt it is particularly severe

on sections having a high sub-soil water table and appears in the orchards 2 or 3 weeks earlier the years following a high Nile flood. The disease is more prevalent in orchards where unfavorable soil conditions such as salinity, poor drainage, and water-logging exist, and planting of trees less than 5 m. apart appears to favor the spread of the disease from tree to tree. Trees on a native root stock (Beladi) appeared to be more frequently attacked than those on Chinese peach, Prunus davidiana, or apricot roots. —J. C. Dunegan.

3150. GUBA, E. F., and C. J. GILGUT. Control of the begonia leaf-blight nematode. Massachusetts Agric. Exp. Sta. Bull. 348. 1-12. 3 fig. 1938.—In the culture of Lady Mac, Melior, and Marjorie Gibbs begonias, a large enterprise in many Massachusetts floricultural establishments, Aphelenchoides fragariae (= Aphelenchus olesistus) is often a serious menace. Sanitary and cultural methods alone have not proved effective, but when coupled with propagation from uninfested stock, satisfactory control has been obtained. All nematode stages in the leaves were killed by submerging potted infested plants in water of a mean temp. of 115° F for 5 min., 117° for 3 min., 1185° for 2 min., or 120.5° for 1 min. In general, 123°-120° for 1 min., 118°-115° for 3 min., or 115°-113° for 5 min. proved safe except to infested leaves, which were severely injured. In a few instances, traces to a very small number of nematodes revived, but either no further symptoms of nematodes revived, but either no further symptoms of disease appeared or the amount after 3 mo. was negligible. Untreated stock continued to show infested leaves and ultimately the contrast was striking. Submersion at 121°-120° for 1 min., 119°-117° for 2 min., or 118°-115° for 3 min is recommended for infested stock, treatments to be tried on a few plants first. As an eradicative control measure, the submersion should be done at least 3 mo. before the marketing season to permit development of well-foliaged plants, but treatment of small plants earlier in the season, when an infestation first becomes noticeable, would be even more practical. Leaves for propagation tolerate water baths of these temp-intervals, and the treatment of healthy leaf-cuttings from infested or unfamiliar outside sources during the winter propagating season is recommended.— F. V. Rand (courtesy Exp. Sta. Rec.).

3151. GUMAER, P. WILCOX. Control of blue mold of tobacco with benzene vapor. Indust. and Engineer. Chem. 30(9): 1076-1081. 12 fig. 1938.—Destruction of blue mould (Peronospora tabacina) on tobacco seedlings in covered frames can be effected by benzene properly vaporized.—M. C. Moore.

3152. HORSFALL, J. G., and R. F. SUIT. Spraying greenhouse seedlings with red copper oxide. Farm Res. [New York State Sta.] 4(2): 9. 2 fig. 1938.—Exptl. reports by growers indicate that greenhouse seedlings subject to infection with damping-off and leaf diseases should be sprayed at weekly intervals with red copper oxide (1-50) or its commercial preparation Cuprocide 54 (1.5-50). Treatments with this fungicide were also used with safety and success on transplants for control of leaf spots.—F. V. Rand (courtesy Exp. Sta. Rec.).

3153. MALLERIN, CHARLES. How I control black-spot. Amer. Rose Ann. 1938: 149-152. 1938.—An outline of the experience of this French rose hybridizer.

3154. MASSEY, L. M. Cooperation in disease control demonstrated in 1937. Amer. Rose Ann. 1938: 129-135. 1938.—The 1937 returns from 80 growers collaborating on the control of diseases and pests of garden roses.—F. V. Rand (courtesy Exp. Sta. Rec.).

3155. MOORE, W. D. Field Studies of certain diseases of snap beans in the Southeast. U. S. D. A. Tech. Bull. 647. 1-28. 2 fig. 1938.—Dry root rot (Fusarium martii phaseoli) was more prevalent where seeding was made at a 2-in. depth than at depths of 1 in. and ½ in. There was no correlation between root rot infection and yield. Root rot tended to decrease as planting was delayed in the spring, but the amount of disease appearing on the earliest dates of planting did not materially affect the total yield over a period of years. Neither the composition of a complete fertilizer or the rate of application affected the development of dry root rot on snap beans. Placement of fertilizer, particularly where the growing roots came in contact with the conc.

chemicals, influenced dry root rot development significantly but the amount of disease did not materially influence yields. Significant differences appeared between vars, of snap beans in susceptibility to both dry root rot and mosaic infection but the damage from either disease did not appear to be responsible for yield differences. Seed treatment with ethyl mercury tartrate improved stands during cool rainy seasons but did not increase yields correspondingly, due probably to plant competition. Mosaic infected plants had significantly fewer pods than healthy plants, and the pods were shorter and of a lighter weight than were those from healthy plants.—W. D. Moore.

3156. OVINGE, A. Kwade harten-proeven in Zeeland in 1937. [Experiments on Marsh Spot of peas in Zeeland in 1937.] Tijdschr. Plantenziekten 44(4): 208-213. 1938.— Various quantities of MnSO4 applied as powder at different periods reduced the % of diseased peas. The best result was obtained with 100-200 kg. per ha. applied just before flowering. When applied in soln, the best treatment was spraying 3 times with 0.1% MnSO₄, once before and twice after flowering. Late treatment of the plants is advisable. There was no influence of the treatment on individual waight of poor but the total violate and advisable. weight of peas, but the total yield was increased slightly .-H. L. G. de Bruyn.

3157. PUSSARD, R. Un appareil mobile pour la désinfection des produits végétaux. Ann. Epiphyties et Phyto-génétique 4(2): 313-331. 7 fig. 1938.—This is a description of a "travelling laboratory" consisting of a motor truck equipped with apparatus for the disinfection of plant materials at any desired temp, and pressure by various toxic gases.-W. V. L.

3158. ROSEN, H. R. Arkansas disease-control work in 1937. Amer. Rose Ann. 1938: 146-148. 1938.—Sanitary measures for control of rose black spot must include not only the removal of all rose refuse, but also (and apparently more important for this section) the destruction of living leaves clinging to the plants, since they were shown to be responsible for overwintering the fungus. Kolotex dust applied once a week during the early part of the season gave promising results, but its continuance during July caused severe leaf burn. 2 yrs.' tests with mulches gave results unfavorable to this practice under Arkansas conditions. F. V. Rand (courtesy Exp. Sta. Rec.).

3159. STARR, G. H. Field experiments on bunt of wheat. Wyoming Agric. Exp. Sta. Bull. 226. 1-23. 7 fig. 1938.—Bunt was present in nearly all the tests undertaken (1932-36), that due to *Tilletia levis* being far more common in the State than the one caused by *T. tritici*. Ceresan and formaldehyde were the most efficient of the fungicides tried for controlling seed-borne bunt, but there was danger of seed injury from the latter. Copper carbonate and Coppercarb gave fairly similar results, but neither was as effective as the other 2 fungicides. Bunt averaged 78.3% in the early plantings, becoming progressively less in subsequent sowings down to an average of 11.5% in the late ones. Temp. relations thus appear to be very important for bunt development. Bunt infection averaged 37.6% in irrigated plats, 26.9% in nonirrigated plats. There was little evidence

of bunt from soil infestation, except possibly in 1935.—
F. V. Rand (courtesy Exp. Sta. Rec.).
3160. SUIT, R. F. Red copper oxide up to date. Amer.
Rose Ann. 1938: 153-157. 1938.—The tests indicate that
for roses Cuprocide 54 removes all the difficulties of ordinary red cuprous oxide relative to suspensibility, a dosage of 2 or to 50 gal of water caused no foliage injury, and the addition of a percent emulsified cottonseed oil proved necessary for the efficient control of black spot and mildew. Notes are also included on other promising sprays for roses. -F. V. Rand (courtesy Exp. Sta. Rec.).

3161. WILSON, J. D., and H. A. RUNNELS. Insoluble copper compounds as vegetable sprays. Ohio State Bimonthly Bull. 191. 48-55. 1938.—Two copper chlorides (basic copper chloride and Cupro-K—a copper oxychloride), and Coposil (copper ammonium silicate), as used in the basic dust formula (1-8-1), are reported to have given excellent results on cucumbers and muskmelons and are recommended for these crops in preference to bordeaux mixture or copper-lime dust. The same materials used in the basic spray formula (4-4-50) increased the tomato yield when disease

was severe enough to act as a retarding factor on fruit production. They are recommended as bordeaux substitutes for this crop (seedbed and field). These materials also compared favorably with bordeaux mixture on carrots, celery, and ginseng, but as yet can hardly be recommended for replacing bordeaux here because of their cost. A number of other insoluble Cu compounds have also given good of other insoluble Cu compounds have also given good results in particular instances, but on the basis of results to date none of them can be as highly recommended for replacing bordeaux as can copper chloride, Cupro-K, and Coposil.—F. V. Rand (courtesy Exp. Sta. Rec.).

3162. ANONYMOUS. Gardenia canker control. New Jersey Agric. Exp. Sta. Nursery Disease Notes 11(3): 9-12.

1938.—A progress report on the canker due to Phomopsis gardeniae.-Courtesy Exp. Sta. Rec.

MISCELLANEOUS

3163. IYENGAR, A. V. V. Contributions to the study of spike disease of sandal (Santalum album Linn.) XVII [i.e. XVIII]-XIX. Jour. Indian Inst. Sci. 20A(1): 1-14. 1937; 21A(8): 89-101. Illus. 1938.—XVIII[i.e. XVIII] Some factors relating to the abnormal accumulation of carbo-hydrates in diseased tissues. XIX. Physiological and physical methods of characterising the disease.

3164. KIENHOLZ, RAYMOND, and C. B. BIDWELL. A survey of diseases and defects in Connecticut forests. Connecticut Agric. Exp. Sta. Bull. 412. 491-559. 26 fig. 1938.— Diseases and defects were tallied on 1,2561/10-acre plots on 4 State forests (mostly hardwoods), with an area of 13,780 acres. Out of 98,420 trees 1 inch DBH and larger on the plots, 17,665 had 21,727 defects. The most widespread and serious defect was Nectria canker (5,721 cases), followed by miscellaneous lesions (3,533), decay (mainly caused by Fomes spp.—3,063), frost crack (2,522), top damage (mainly breakage by snow or sleet—1,921), mechanical injury (1,684), borer injury (963), fire scar (935), and Strumella canker (215). Red maple, scarlet oak, and beech were most subject to these defects, and white birch, white ash, and sugar maple were relatively free from them. Especial attention is given to the incidence of Nectria canker and to its control.—W. N. Sparhawk.

3165. MARTIN, J. P. Sugar cane diseases in Hawaii. Hawaii. Sugar Planters' Sta. xiv+295p. 13 pl., 150 fig. 1938.—The author has compiled the data accumulated at the Exp. Station over a 30-yr. period, both published and unpublished. Each disease is described and illustrated. Following a general, introductory section, he takes up in succession the diseases affecting the leaves, leaves and stalk, stalk, and roots. Growth failure and malnutrition, maldevelopment, and miscellaneous injuries also receive attention, and for each disease its history, description, cause, transmission (where parasitic), economic importance, and

control are discussed.—Courtesy Exp. Sta. Rec.
3166. MURRAY, R. K. S. Root disease with special reference to replanting. Rubber Res. Scheme Ceylon Quart. Bull. 15(1): 24-31. 1938. 3167. RAMSEY, G. B., J. S. WIANT, and G. K. K. LINK.

Market diseases of fruits and vegetables: Crucifers and cucurbits. U. S. Dept. Agric. Misc. Publ. 292. 1-74. 23 pl. 1938.—This is a handbook, illustrated in part with colored plates, and with 209 literature citations.—F. V. Rand (courtage of the contract tesy Exp. Sta. Rec.).

3168. TISDALE, W. B. Fifty years of plant pathology research. Citrus Indust. 19(11): 8-9. 1938.

3169. VARIOUS AUTHORS. Abstracts of papers presented at the thirtieth annual meeting of the American Phytopathological Society, Richmond, Virginia, December 27 to 30, 1938, inclusive. *Phytopathology* 29(1): 1-25, 1939. —Abstracts of the following papers are included: Studies on Septoria bromigena, by J. L. ALLISON; Effect of Nutrient Variations on Host and Parasite in the Rhizoctonia Stem Rot Disease of Bean, by E. J. ANDERSON; The Factorial Interpretation of Anthracnose Resistance in Beans, by C. F. ANDRUS; Pathogenicity Experiments With Isolates of Fusarium vasinfectum Causing Cotton Wilt, by G. M. ARMSTRONG, J. D. MacLACHLAN, and R. WEINDLING; Movement of the Virus of Tobacco Mosaic, by C. W. BENNETT; The Effect of Insect Juices on the Infectivity of Plant Viruses, by L. M. BLACK; Decay of

Hardwoods by Ustulina vulgaris and Other Ascomycetes, by D. J. BLAISDELL; The Response of Phymatotrichum omnivorum to Heavy Metals and Other Elements, by L. M. BLANK; Natural Water-soaking and Bacterial Infection, by A. C. BRAUN and J. JOHNSON; Two Distinct Viruses From the Mosaic Complex in Lilium longiforum, by P. BRIERLEY; Marsh Spot of Peas Caused by Manganese Deficiency, by H. L. G. de BRUYN; Daedalea unicolor on Maples and Other Hardwoods, by W. A. unicolor on Maples and Other Hardwoods, by W. A. CAMPBELL; Sterile Conks of Polyporus glomeratus and Associated Cankers, by W. A. CAMPBELL and R. W. DAVIDSON; Effect of Temperature on Infection and Development of Eight Physiologic Races of Puccinia graminis tritici on Wheat Seedlings, and Effect of Temperature on Urediospore Germination and Germ Tube Development of Five Physiologic Races of Puccinia graminis tritici, both by R. C. CASSELL; Source of Leaf-Rust Inoculum for Fall Infection of Wheat, by K. S. Chester; Heat Treatments of Black Locust for Root-Knot Control, by K. S. CHESTER and M. CRESS: Funcicidal Studies With Special Reference and M. CRESS; Fungicidal Studies With Special Reference to the Vegetable Oils, by E. E. CLAYTON and H. H. FOSTER; White Root Rot of Apple Trees (Corticium galactinum), by J. S. COOLEY and R. W. DAVIDSON; The Hawkesbury Watermelon, a Promising Wilt-Resistant Variety, by H. T. COOK and T. J. NUCENT; Two Years' Variety, by H. T. COOK and T. J. NUGENT; Two Years' Experiments in the Control of Cherry Leaf Spot (Coccomyces hiemalis), by R. H. DAINES; A Study of the Yellow Mosaics of Potato, by T. P. DYKSTRA; Psorosis in Relation to Other Virus-like Effects on Citrus, by H. S. FAWCETT; Early Planting, an Aid in the Control of Onion Smut, by E. L. FELIX; Yield Reduction by Lime Sulphur on Apple Trees, by D. FOLSOM; Immunization of Sugarcane as a Basis for Determining Validity of Virus Classification, and Production of Setae by Colletotrichum falcatum in Culture, both by I. L. FORBES; Effect of Environment on Metabolism of Tomato Plant as Related to Development of Blossom-end Rot of the Fruit, by to Development of Blossom-end Rot of the Fruit, by A. C. FOSTER; Physico-Chemical Studies on the Tobacco-Mosaic Virus Protein, by V. L. FRAMPTON; The Fungicidal Activity of Phenothiazine and Some of Its Oxidation cidal Activity of Phenothiazine and Some of Its Oxidation Derivatives, by M. C. GOLDSWORTHY and E. L. GREEN; Fusarium Species Associated With Diseases of Cereals in Manitoba, by W. L. GORDON; Systemic Brooming of Robinia pseudoacacia and Other Virus-like Diseases of Trees, by T. J. GRANT; The Epidemiology of Seed-borne Microorganisms in Cereals, by F. J. GREANEY and J. E. MACHACEK; Observations on the Supposed Colloidal State of Sulphur in Fused Bentonite Sulphur, and Particle Size of Elementary Sulphur Fungicides, both by A. E. GROVES; A Red Forcing Tomato Resistant to Cladosporium Leaf Mold. by E. F. GUBA: The Resistant to Cladosporium Leaf Mold, by E. F. GÜBA; The Effect of Various Soil Amendments on the Development of Club Root (Plasmodiophora brassicae) of Crucifers, by C. M. HAENSELER; Cultural Studies on a Species of C. M. HALMSELLER; CHITUTAI STUDIES on a Species of Entomorphthora from the Apple Leaf Hopper (Typhlocyba pomaria), by J. G. HARRAR, L. I. MILLER, and S. A. WINGARD; Physiologic Races of the Fungus Causing Bean Rust, by L. L. HARTER; The Clonal Variety for Tree Planting—Asset or Liability? by C. HARTLEY; Yellow Chyrous Oxide as a Funcicide of Small Particle Tree Planting—Asset or Liability? by C. HARTLEY; Yellow Cuprous Oxide as a Fungicide of Small Particle Size, by J. W. HEUBERGER and J. G. HORSFALL; Red Leaf Disease of Grapes in California Cured by Controlling Mites, by W. B. HEWITT, H. E. JACOB, E. L. PROEBSTING, and J. F. LAMIMAN; A. Transmissible Disease of Grapevines, by W. B. HEWITT; Internal Bark Necrosis of Delicious Apple, a Physiogenia ("Boron-Deficiency") Disease and Two Europi (Valsa Jenico) "Boron-Deficiency" Disease, and Two Fungi (Valsa leucostoma and V. cincta) Besides Brown Rot (Sclerotinia fructicola) Prominently Involved in Peach-Canker Complex, both by E. M. HILDEBRAND; Delayed Spraying of Tomatoes, by J. G. HORSFALL and J. W. HEUBERGER; A Maple Blight in Rhode Island, by F. L. HOWARD and N. CAROSELLI; Chemical Control of Nematodes in Tomato Greenhouses, by F. L. HOWARD, F. L. STARK, and J. B. SMITH; Bordeaux Mixture as a Summer Fungicide for Peaches, and Removal of Spray Residue With Sodium Hydroxide, Sodium Carbonate, and Acetic Acid, both by R. H. HURT; Apparent Localization of Phony Disease Virus in the Woody Cylinder, by L. M.

HUTCHINS; Promising Results of Heat Treatments for Inactivation of Phony Disease Virus in Dormant Peach Nursery Trees, by L. M. HUTCHINS and J. L. RUE; White Rust of Spinach, S. S. IVANOFF; The Relation of Copper Fungicides to Lead Arsenate-Lime and Fixed Nicotine-Oil Sprays, by K. J. KADOW, M. W. GOODWIN, and S. L. HOPPERSTEAD; Calomel as a Soil Treatment for the Control of Pateto Seeh in Michigan Long Island. for the Control of Potato Scab in Michigan, Long Island, and New Jersey Soils, by G. KENKNIGHT; Spraying Experiments for Control of Coccomyces Leaf Spot of Sour Cherry, by G. W. KEITT and C. N. CLAYTON; Stony Pit, a Transmissible Disease of Pears, by J. R. KIENHOLZ; Physiologic Specialization in Fomes lignosus, by T. H. KING; The Occurrence of Lysis in Certain Crosses of Sphacelotheca sorghi, by T. LASKARIS; Some Recent Disease Developments in Forest Tree Nurseries, by D. H. LATHAM, and W. C. DAVIS; Mycorrhizae and Pseudomycorrhizae on Pines, by D. H. LATHAM, K. D. DOAK, and E. WRIGHT; Further Experiments on the Cause of "Purple-top Wilt" of Potatoes, by J. G. LEACH; Influence of Moisture and Other Factors on the Efficiency and of Moisture and Other Factors on the Efficiency and Safety of Sugar-Beet Seed Treatment, and Practical Application of Indexing for Sclerotium rolfsii Infection on Sugar Beets and Some Modifying Conditions, both by L. D. LEACH and B. R. HOUSTON; A Bacterial Wilt of Lespedeza, by C. L. LEFEBVRE, T. T. AYERS, and H. W. JOHNSON; Hyperauxony of Nodules of *Phaseolus vulgaris*, by G. K. K. LINK and V. EGGERS; Production of Growth Substance on Peptone Broth by Crown-gall Bacteria and Related Non-gall-forming Organisms, by S. B. LOCKE, A. J. RIKER, and B. M. DUGGAR; An Analysis of Factors Causing Variations in Spore Germination Tests of Fungicides, by S. E. A. McCALLAN and F. WILCOXON; Some Further Experiments With Seed Disinfection in Cereals, by J. E. MACHACEK and F. J. GREANEY; Comparative Studies on Two Genotypes of Nicotians tabacum. Resistant to Nicotians Virus 1 by H. H. tabacum Resistant to Nicotiana Virus 1, by H. H. McKINNEY; Invasiveness of Phytomonas stewarti in Sweet Corn Supplied With Different Amounts of Nitrogen, by G. L. McNEW and E. L. SPENCER; X-Ray Diffraction Study of Tobacco Mosaic Virus Proteins Prepared by the Sodium Sulphate Method, by D. K. McREYNOLDS, N. S. GINGRICH, and C. G. VINSON; Pathogenicity of Actinomycete Isolates on Sweet Potato, by W. J. MARTIN and L. H. PERSON; A Disease of Gloxinia Caused by Phytophthora cryptogea, by J. T. MIDDLETON and C. M. TUCKER; Control of Cercospora Leaf Spot of Peanut with Copper and Sulphur Fungicides, by L. I. MILLER, E. T. BATTEN, and S. A. WINGARD; Apple Rusts in Relation to Varietal Susceptibility, by P. L. MILLER; Snapdragons Resistant to Two Races of Puccinia antirrhini, by R. NELSON; Progress in Control of Onion Mildew (Peronospora destructor) in New York, and Two New Electrical Devices for Pasteurizing Soil, both by A. G. NEWHALL; Adherence Properties of Copper Fungicides as Determined by Chemical Analyses and by Cataphoresis, as Determined by Chemical Analyses and by Cataphoresis, by A. A. NIKITIN; Chloropicrin as a Seed Disinfectant for Control of Black Rot of Kale, by T. J. NUGENT and H. T. COOK; Seed Treatment for the Control of Bacterial Blight of Beans, by L. H. PERSON and C. W. EDGERTON; Bacterial Leaf Spot of Dieffenbachia, by P. P. PIRONE; Cercospora Leaf Spot of Strawberry, and A. New Manager of the Strawberry, and A. New Mycosphaerella Leaf Spot of Strawberry, both by A. G. PLAKIDAS; Comparison of Thermal Inactivation Rates of Two Plant Viruses, by W. C. PRICE; A Rapid Reagent-Indicator Method for the Detection of the Mosaic Virus Agent in the Tobacco Plant, by A. J. QUIRK; A Microchemical Study of Gum Pocket Formation in Sweet Cherry Wood, and Recent Findings Regarding the Buckskin Disease of Cherries, both by T. E. RAWLINS; The Influence of Crown Gall and Hairy Root on Growth of Young Apple Trees, by A. J. RIKER; Factors Affecting the Longevity of Urediospores of Puccinia coronata avenae, by H. R. ROSEN and L. M. WEETMAN; A Non-transmissible Spindling Sprout of Potato, by E. S. SCHULTZ; Effects of Different Dates of Transplanting Tobacco on the Control of Losses Caused by Heterodera marioni, by K. J. SHAW; Variability in Fusarium vasinfectum, by C. D. SHERBA- KOFF; Field Survey of the Relation of Susceptible Weeds to Granville-Wilt Control, by T. E. SMITH and R. K. GODFREY; The Effect of Nitrogen Nutrition in Concentration of Tobacco-Mosaic Virus, by E. L. SPENCER; Observations on Stem-Rust Epidemiology in Mexico, by E. C. STAKMAN, W. L. POPHAM, and R. C. CASSELL; Influence of Environment, after Seedling Emergence, on Loose Smut of Oats and Covered Smut of Barley, by V. F. TAPKE; Effects of Ceratostomella ulmi on Ulmus americana and Some Types of European Elm, by J. M. WALTER; A Water-Culture Infection Method Used in the Study of Fusarium Wilt of Cotton, by R. WEINDLING and G. M. ARMSTRONG; Mercuric Oxide as a Soil Antiseptic Against Fusarium Rot of Narcissus Bulbs, by F. WEISS and F. A. HAASIS; Nectria Canker in Relation

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ECOLOGY

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W. L. McATEE, Ecology of Wildlife Management—Terrestrial

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GENERAL.

3481. DAVIS, C., M. F. DAY, and D. F. WATERHOUSE. Notes on the terrestrial ecology of the Five Islands. I. Proc. Linn. Soc. N. S. Wales 63(5/6): 357-388. 6 pl., 8 fig. 1938.—The Five Islands, near Port Kembla, N.S.W., were chosen for an ecological survey because certain factors peculiar to islands appeared to be intrinsically interesting and because it was hoped that the terrestrial life of the islands represented a more or less self-contained unit. This paper treats of the geological and physiographical history of the islands, the climate, the plant ecology, and the various ways in which the islands fail to represent "closed" communities. The departure from the ideal closed community is due to products of littoral and pelagic communities, and of terrestrial communities from the mainland, becoming involved in the food-chains of the terrestrial life of the islands. Habitats for terrestrial animals, other than those embraced by communities of vascular plants, are listed.—Authors.

3482. DUNMORE, F. W. An electric hygrometer and its application to radio meteorography. U. S. Jour. Res. Nation. Bur. Standards 20(6): 723-744. 22 fig. 1938.—This paper, in the nature of a progress report, deals with the development of an electric-type hygrometer without moving parts or appreciable lag. This makes possible a more rapid ascent and humidity measurements can be made at higher altitudes. This type of hygrometer appears to offer a new tool for measuring humidity in the upper air. Further flight tests and the development of means of calibration at low temps. are all that is now needed to adapt the apparatus to routine measurements.—Courtesy Exp. Sta. Rec.

3483. GAMS, H. Neue Arbeiten über das Klima der letzten Eiszeit. Bioklimatische Beiblätter 5(4): 159. 1938.

—A review of recent papers by Beck, Firbas, Gams, Gross, Hyppä, Oberdorfer, Penck, and Schütrumpf.—H. Landsberg.

3484. GUNN, D. L., and C. A. COSWAY. The temperature and humidity relations of the cockroach. V. Humidity preference. Jour. Exp. Biol. 15(4): 555-563. 1938.—In a diffusion gradient of humidity at uniform temp., some cockroaches (Blatta orientalis) tend to spend more time in the drier region. Other individuals seem indifferent to the stimulus of air humidity. On desiccation, cockroaches tend to become hygro-positive. In a temp. gradient, those individuals which react to humidity have a slightly but significantly higher preferred temp. in somewhat moist air than they have in dry air. It seems, then, that the observed preferred temp. represents a kind of balance between a pure temp. reaction and a humidity reaction. The change in humidity reaction resulting from desiccation is qualitatively satisfactory to explain the fall in preferred temp. which occurs at the same time.—Auth. summ.

3485. MERKER, E. Der Einfluss kurzweiligen Lichtes auf die Tierwelt. Bioklimatische Beiblätter 5(4): 167-173. 1938.—A review of 46 papers of the author and his collaborators covering the period 1921-1938. After an introduction the first chapter deals with the visibility of u.-v. by invertebrates and vertebrates, Chap. 2 with the harmful effects of irradiation with short wave-lengths, and Chap. 3 with the influence of light in conjunction with other environmental factors.—H. Landsberg.

3486. PEARL, RAYMOND. The natural history of population. viii+416p. Oxford University Press: New York, 1939. Pr. \$3.50.—This book is devoted to an analysis of the more directly biological factors and forces involved in the natural history of populations. It discusses the basic pattern of human reproductivity, and discusses the ways in which it differs from that of lower animals. The fertility differentials in the U. S. relative to race (Negro versus White) and to the 3 social class differentiations are found to be due primarily to differences in the relative prevalence and effectiveness of the efforts made to prevent conception aided by the postponement of marriage and the practice of criminal abortion. The economic and social consequences of the present trends in world populations are discussed as is the significance of population density in relation to war. The book is based upon a wealth of case histories and is well illustrated by tables and graphs. It contains a bibliography of 700 titles.

3487. PIERCE, W. DWIGHT, and DOROTHY POOL. The fauna and flora of the El Segundo sand dunes. 1. General ecology of the dunes. Bull. Southern California Acad. Sci. 37(3): 93-97. 1938.—The initial report in a projected series of papers describing the life in a restricted sand dune area of Los Angeles Co., California. Thirteen areas of distribution are defined, in which 75 spp. of plants have been studied. The commoner plants are listed according to the portions of the dune on which they are found.—

W. D. Pierce.

3483. RANT, A. Der Ameisenbaum Endospermum molucanum (T. et B.) Becc. und seine Ameisen. Ann. Jard. Bot. Buitenzorg 48(3/4): 123-128. 3 pl. 1938.—Two spp. of Endospermum (Euphorbiaceae)—E. molucanum and E. formicarum—are found in the eastern part of the Malay Archipelago. The stems of both are inhabited by the ant Camponotus quadriceps. Experimentally it was shown that Camponotus is unable to live in other myrmecophilous plants, such as Acacia spadicigera, Cecropia palmata and Myrmecodia echinata. Endospermum is not damaged by the ants; they bore only in the pith of the stem. The walls of the cavities formed by the ants are soon covered by moulds, but these are not cultivated by the ants.—A. Rant.

3489. TRAPP, E. Untersuchungen über die Verteilung der Helligkeit in einem Buchenbestand. Bioklimatische Beiblätter 5(4): 153-158. 5 fig. 1938.—Measurements were made with Lange photocells with platinum-opal filters in a beech forest of 120 to 150 year old trees, average height 28 m., on a slope with 20° inclination toward the SE, near the Alpine Biol. Station, Lunz, altitude 800 m. During Aug., when the trees were in full foliage, on bright days at noon the brightness on the floor of the forest was 6% of the outside value, on dull days 4%. The vertical brightness distribution in the forest is a steep exponential function decreasing from 100% above the tree tops in the first 5 m. of the foliage to less than 20%. A chart of the foliage density and the distribution of brightness on dull days shows their close resemblance. The brightness distribution on dull days also shows a correlation to the surface flora. On bright days the light distribution in the forest is very patchy and not readily accessible to a generalizing analysis.—H. Landsberg.

3490. TURNAGE, WILLIAM V., and EDITH B. SHREVE.

Note on atmospheric aridity. Ecology 20(1): 107-109. 1 fig. 1939.—Preliminary calibration of the Livingston white. spherical, porous clay atmometer against environmental factors is presented. Curves show the relation of evaporation to wind velocity for various depressions of the wet bulb. The difficulty of measuring wind velocity and the error involved in treating arithmetical averages of wind movement against a factor related in a non-linear manner to wind movement are noted.—W. V. Turnage.

ANIMAL

3491. BERTELSEN, E. Contributions to the animal ecology of the fjords of Angmagssalik and Kangerdlugssuaq, in East Greenland. Meddelelser om Grønland 108(3): 1-58. 2 pl. 1937(rec'd 1-24-38).—The composition of the characteristic fauna of the tidal zone and at small depths the euryhaline littoral fauna seems to be detd. by the ability of the forms present to adapt themselves to the very varying salinities of the upper layers. In the Kangerdlugs-suaq area this is characterized by the absence of molluscs and Balanus balanoides. In the more southernly area of Angmagssalik Littorina rudis and Arenicola marina are found, in addition to Mysis oculata and the characteristic amphipoda. Characteristic of the euryhaline littoral fauna of both areas is the absence of infauna molluses and echinoderms. In the investigated areas of Angmagssalik, the Venus fluctuosa community is found in sandy localities near river mouths in the fjords at depths ranging from 4 to 25 m. The Macoma calcaria community is typically developed in the inner fjords of the Angmagssalik area on clay bottoms from 4-5 down to 50 m. In Uttental Sound in the kangerdlugssuq area the Arca-Astarte crenata community seemed to have partially replaced the Macoma calcaria community, since here it occurred in a somewhat modified form up to 25-30 m. From 3-5 m. down to the lower limit of the vegetation the epifauna of the vegetation is characterized by Modiolaria laevigata, Margarita groenlandica and Harmothoe imbricata. The epifauna of the stones is everywhere dominated by ascidians, bryozoans and sponges. In addition Pista maculata, Ophiacantha bidentata, Saxicava arctica, Trichotropis conica and Stegocephalus inflatus are characteristic constituents. The main part of the Nekthobenthos consisted of spp. of Spironto-caris and some few fish spp.—The quantitative bottom samples collected showed that the density of the shallow water communities in the Angmagssalik area is high.—E.

3492. DAVIS, W. B., R. R. RAMSEY, and J. M. ARENDALE, Jr. Distribution of pocket gophers (Geomys brevices) in relation to soils. Jour. Mammal. 19(4): 412-418. 1938.—On the 75-acre tract studied, pocket gophers occur only in soils of the Lufkin and Ochlockonee series, both of which have deep, sandy surface soil. They are absent from the Wilson clay loam and usually from the Ochlockonee silt loam. Pocket gophers require at least 4 inches of sandy top soil in which to burrow, particularly where the subsoil consists of plastic, sticky, impervious clay into which they do not penetrate; they do not occur in the Lufkin soils where the soil of the A horizon is less than 4 inches deep; absence of pocket gophers from hill sides where the soil is of the Lufkin series probably is a good indicator of excessive sheet erosion. The average depth to which pocket gophers burrow in the vicinity of College Station, Texas, is 7.84 inches; the average diam. of the burrows is 2½ inches. The pH value of the soil is not correlated with the distribution of pocket gophers; they are as successful in very acid soil as in neutral or basic soils. In the area studied pocket gophers never extend their burrows into the clay subsoil; their activities are restricted entirely to the A horizon. The average density on the 75 acre tract was 0.67 gophers per acre; excluding all non-inhabited areas, the density was 1.35 gophers per acre. These figures are thought to be close to the average for the Lufkin fine sandy loam in Brazos County. The highest density record available for Texas is 6.8 gophers per acre in deep Norfolk sandy soil.—Auth. summ.

3493. ENDERS, ROBERT K. Changes observed in the mammal fauna of Barro Colorado Island, 1929-1937. Beology 20(1): 104-106. 1939.—Observations extending over 8 years indicate that the mammal fauna was fairly stable up to 1932. Since that date the numbers of puma, ocelot, collared and white lipped peccary, and tapir have decreased while the monkeys, armadillo, three-toed anteater and terrestrial rodents have increased. These changes may have been brought about by poachers.—R. K. Enders.

3494. GOMPEL, M. Recherches sur la consommation d'oxygène de quelques animaux aquatiques littoraux. Ann. Physiol. et Physicochim. Biol. 14(5): 914-932. 1938.—The oxygen consumption of animals living on a sea-shore varies rhythmically with the tide; the maximum coincides with the flow, the minimum with the ebb. This rhythm is characteristic for all classes of littoral marine animals.—J. W. Langelaan.

3495. GRINNELL, JOSEPH. Effects of a wet year on mammalian populations. Jour. Mammal. 20(1): 62-64. 1939.—Observations made on numbers and distribution of rodents and rabbits in northeastern California following a flood season led to the conclusion that sudden and irregular local floods are highly important in causing non-cyclic fluctuations in populations of rodents which live in the southwestern U. S.

3496. HATFIELD, DONALD M. Studies on rodent populations in a forested area. Jour. Mammal. 19(2): 207-211. 1938.—Seven quadrats were staked out in various of the forest types to be found in northern Minnesota. Each of these quadrats, 24 feet square, was set with 25 snap traps separated by 6-foot intervals. Under these conditions, 2250 trap nights resulted in the capture of 110 rodents. Peromyscus was most frequently represented, with Clethrionomys 2d and Zapus 3d. Greatest numbers of mice were caught in jackpine (Pinus banksiana) and open aspen (Populus tremuloides) stands. Fewest were taken in a spruce-balsam (Picea canadensis, P. mariana, Abies balsamea) swamp. A comparison of daily catch of Peromyscus with minimum temp. reveals a rough correlation; the lower the temp., the fewer the individuals caught.—D. M. Hatfield.

3497. HIGGINBOTHAM, A. CURTIS. Studies on amphibian activity. I. Preliminary report on the rhythmic activity of Buso americanus americanus Holbrook and Buso fowleri Hinckley. Ecology 20(1): 58-70. 1 fig. 1939.—Records were taken under normal fluctuations of daylight intensity and in an exptl. cabinet in which temp. and relative humidity were held relatively constant while the periods of illumination were varied. In all of these exps. the movements of the exptl. animals were transmitted to 24-hr. kymograph drums carrying waxed recording paper. Activity records were taken usually for 10 consecutive days. Data obtained under normal fluctuations of daylight, constant light, constant darkness, and reversed illumination indicate an inherent activity rhythm in mature individuals.—A. C. Higginbotham.

3498. JEWELL, MINNA E. An ecological study of the fresh-water sponges of Wisconsin. II. The influence of calcium. Ecology 20(1): 11-28. 1 fig. 1939.—A study of Spongillidae from 157 lakes and 24 streams in Wisconsin shows a marked correlation between the distribution of the various species and the calcium carbonate content of the water, and a less marked correlation between distribution and the Mg content of the water. Experimental rearing of Spongillidae in chemically modified waters indicates that calcium carbonate is important in their distribution whereas MgSO. is not, when in cones. usually encountered in nature. Ephydatia mulleri is absent from both high and low Ca waters. Heteromyenia argyrosperms is probably similarly restricted by Ca. Spongilla fragilis was found in waters of Ca content varying from 2.08 to 18.6 mg. per liter. H. repens and H. ryderi are both tolerant of a wide range of Ca content. Tubella pennsylvanica is restricted to waters of low Ca content. Spongilla ingloviformis is the most Ca sensitive of the spp. studied. Ephydatia everetti, although collected only from waters of low Ca content, was able to grow and form gemmules after transfer to waters of much higher Ca content. Spongilla lacustris was the only species which flourished in spite of rapid marl or travertine deposition.—M. E. Jewell.

3499. KUNZ, HELMUT. Die sandbewohnenden Copepoden von Helgoland. Teil I (Studien an marinem Copepoden II). Kieler Wiss. Meeresjonsch. 2(2): 222-255, 12 fig.

1938.—5 sand zones (Biotopes) are recognized and described as copepod habitats. The taxonomic arrangement of the group is reviewed with emphasis on the biotopes occupied, and general range, as well as specific and comparative measurements and drawings of the species found in this investigation with suggested keys for the genera.— W. M. Morton.

PLANT

3500. AIKMAN, J. M., and A. W. SMELSER. The structure and environment of forest communities in central Iowa. Ecology 19(1): 141-150. 3 fig. 1938.—Shrub, oakhickory and maple-linden communities are well established on the rough land bordering streams near the center of the prairie association in central Iowa. Of the factors affecting plant growth, the following are highest in the prairie and progressively lower from the shrub community through the oak-hickory to the linden-maple: mean air temp., mean soil temp., radiant energy, evaporation and wind velocity. Relative humidity and available soil moisture during favorable seasons are lowest in the shrub and highest in the maple-linden. The total difference in factors is made up of the modifications caused by topographical differences and those caused by the protection afforded by the plants of the community. As compared to the maple-linden community, the oak-hickory has a greater number of dominant spp. and of individual trees but the trees are smaller, the canopy less dense and the undergrowth more abundant. The influence of high N content and plant-cover density of mature prairie soils in the maintenance of prairie vegetation is emphasized by the observed invasion of shrubs and trees on the slopes of newly formed gullies of lower N content and of less dense plant cover.—J. M. Aikman.

3501. CROXTON, W. C. A study of the tolerance of trees to breakage by ice accumulation. *Ecology* 20(1): 71-73. 1939.—A bad sleet storm in 1937 caused great damage to trees in Missouri and Illinois. Among the most damaged were Betula alba, B. lutea, Ulmus americana, Populus spp., Acer saccharinum, and Platanus occidentalis. Among the most resistant were Carya ovata, Tsuga canadensis, Quercus alba, Thuja occidentalis, Júglans nigra, Pseudotsuga taxifolia, and Gleditsia triacanthos. Other spp. showed a varied amount of damage.—W. C. Croxton.

3502. FRASER, LILIAN, and JOYCE W. VICKERY. The ecology of the Upper Williams River and Barrington Tops districts. II. The rain-forest formations. Proc. Linn. Soc. N. S. Wales 63(3/4): 139-184. 7 pl. 1938.—The sub-tropical rain-forest consists largely of trees, no one of which becomes dominant. The tree stratum is continuous and characterizes the formation; the shrub and herb strata are discontinuous and scanty. Many of the spp. show Indo-Malayan affinities. Variation in the composition of the forest is largely due to change, although in special cases it may be due to variations in the habitat. The sub-tropical rainforest is advancing over the adjacent Eucalypt forest, the rate of advance being governed by local conditions such as aspect and drainage. Species features such as the presence of lianes and epiphytes, buttressing of the tree trunks, and leaf and seed characters are discussed. Regeneration of the forest after partial destruction is considered. The sub-antarctic forest is dominated by Nothofagus moorei; a few other trees, some of them intrusive from the sub-tropical rain-forest, may be present in small numbers. Shrub and herb strata are extremely scanty. Lianes and epiphytic ferns and Angiosperms are rare, but there is an abundant development of mosses and lichens on tree trunks and rocks. The sub-antarctic rain-forest is also advancing over the adjacent Eucalypt forest in areas of suitable shelter, but is probably more or less stationary with regard to its contact with the sub-tropical rain-forest, with which it mingles along its lower limits. Margin communities along the boundaries of both rain-forest formations are descr.-Authors.

3503. GEORGESCU, CONST. C., și CONST. D. IONESCU. Studiu asupra limitei pădurei spre golul alpin în basinul superior al Ialomiței (Bucegi). [The upper limit of forest in the higher portion of the Ialomita Valley (Rumania).] [With Fr. summ.] Rev. Pădurilor [Bucharest] 50(12): 10751093. 8 fig. 1938.—The relation of timber line to topography, aspect, altitude, ground surface, and other factors is discussed.—W. N. Sparhawk.

3504. HEUGEBAUER, HANS FRANZ. Zur Ökologie von in Buchenkronen epiphytisch lebenden Flechten. Beitr. Biol. Pflanzen 25(3): 273-289. 4 fig. 1938.—The ecology of 6 spp. of lichens (Parmelia caperata, P. fullginosa, P. furfurace, P. physodes, P. saxatilis, and Usnea dasypoga) which live epiphytically in the crown of beech trees was investigated. The water content, the water-holding capacity, the water loss, the water intake, the assimilation and the respiration of these spp. were measured. Under certain conditions these lichens can hold an amount of water equal to 3 times their net weight. Certain spp. lose water more rapidly than others because of their form. Lichens do not lose water as rapidly as grey filter paper. P. furfuracea loses its water faster at first than P. caperata but because of its folding the water loss is retarded and it finally contains a greater amount of water than P. caperata. In a supersaturated NaCl soln. P. caperata was found to contain water in the amount of 13.5% of its dry weight; P. furfuracea, 21.8%; and Usnea dasypoga, 23.1%. The greatest assimilation rate was by P. saxatilis, with 33 mg. CO₂ per 1 g. of net weight. The assimilation rate of *P. furfuracea* was strongly inhibited during the moist weather while in *P. carperata* and *P. olivaria* the assimilation rate is slightly increased. The respiration of the lichens examined in this research was 2-3 times as great in wet weather as in dry weather.—G. C. Couch.

3505. HORIKAWA, YOSHIWO, und WAKASI SATO. Studien über die Lebensformen der Phanerogamen in Japan-Hondo und über den Ptph-Q in Japan. Jour. Sci. Hirosima Univ. Ser. B, Div. 2 (Bot.) 3(art. 5): 57-67. Map, 4 pl. 1938.—Japan-Hondo (Honsyn, Sikoku, and Kyusyu) lies between 31° and 41.5° N. lat. with a mean annual temp. of 13.5° C (9.3° at Aomori to 16.7° at Kagosima) and precipitation of 1660 mm. (994 mm. at Nagano to 2184 mm. at Koti). The climate is continental, from cold to warm temp,, and the vegetation ranges from summergreen and conifer forest in the north to broadleaf evergreen in the south. The climate is conspicuously hemicryptophytic (47.38% H. in contrast to only 26% H. for the normal spectrum). Geophytes likewise are outstanding (1.02% G. in contrast to 4% G. for the N.S.). The latter occur mostly in contrast to 4% G, for the N.S.). The latter occur mostly in the cold temperate regions and are about 80% Monocotyledons. The greatest deficiency is in Chamaephytes which constitute only 2% of the 3,601 spp. of the flora. The Pteridophyte quotient (Ptph-Q.) is given for 14 Japanese regions. Japan-Hondo with its temperate continental climate has a quotient of about 2.3. The smallest the continent of the smallest of the state of the smallest Ptph-Q. is 1.4 for the northern island of Karahuto. The largest PtpH-Q. is 6.2 for the Bonin Islands with their subtropical oceanic climate.—S. A. Cain.

3506. LITTLE, ELBERT L., Jr. The vegetation of the Caddo County Canyons, Oklahoma. Ecology 20(1): 1-10. 3 fig. 1939.—Four sandstone canyons in Caddo and Canadian counties, west central Oklahoma, have a rich, eastern deciduous forest, in which Acer saccharum is dominant and disjunct at the extreme western limit of the

species. It is regarded as a relict of a more humid climate. egetation of the canyons is described, and lists of 27 trees, 17 shrubs, 10 woody vines, and characteristic herbs are included.—E. L. Little, Jr.

3507. MARR, COLIN C. An agricultural survey of the Markham Valley in the Morobe District. New Guinea Agric. Gaz. 4(1): 2-12. 1938.—An ecological description of the topography, drainage, elevation, geology, soil, climate, and principal plant life of this New Guinea valley.—W. D. Pierce.

3508. MOXON, ALVIN L., OSCAR E. OLSON, WALTER V. SEARIGHT, and KIRK M. SANDALS. The stratigraphic distribution of selenium in the Cretaceous formations of South Dakota and the selenium content of some associated vegetation. Amer. Jour. Bot. 25(10): 794-809. Map. 1938 .-Composite samples of some Cretaceous rocks of S. Dakota. and samples of plants growing on material derived from Cretaceous rocks, were analyzed for Se. The Smoky Hill member of the Niobrara formation, the Sharon Springs member of the Pierre formation, and, locally, the Mobridge member and a chalky bed in the Upper Virgin Creek member of the Pierre formation, were found to be highly seleniferous. A correlation was found between the Se content of the formations and the Se content and type of

plants growing on them .- O. E. Olson.

3509. OBERDORFER, E. Pflanzensoziologische Probleme des Oberrheingebietes. Ber. Deutsch. Bot. Ges. 55(General-versammlungs-Heft): 187-194. 1937.—The upper Rhine valley is a phytogeographical transition zone for many plant species. Many continental Eurasian communities have their western limit here, e.g., the Stipa community and the Pinus sylvestris "steppe forest" near Mainz. On the rainy slopes of the Oden Forest and of the Black Forest many associations are found which are characteristic of the Atlantic coastal plain. The peculiarities of the "meadow forests" are described. Level land and rich soil is occupied up to an elevation of 500 m. by an oak-hornbeam-red beech climax. It is suggested that the concept climax be applied to a group of associations or plant alliances rather than a single association.—H. C. Beeskow.

3510. PESSIN, L. J. Root habits of longleaf pine and associated species. *Ecology* 20(1): 47-57. 3 fig. 1939.—Excavations were made of more than 120 plants including longleaf pine (*Pinus palustris*) seedlings and grasses and herbs commonly associated with longleaf pine in southern Missis-sippi and Louisiana. The roots of longleaf pine seedlings often display differences in symmetry under natural conditions owing to the presence in the soil of old root holes and charcoal pockets. Most lateral roots occur within the upper foot of soil, where most of the roots of the grasses and herbs also occur, suggesting the existence of a keen competition in the soil between the pine roots and those of associated plants. Removal of grasses and herbs from an area results in a marked increase in the growth of the pines.-L. J. Pessin.

3511. POTZGER, J. E. Microclimate and a notable case of its influence on a ridge in central Indiana. Ecology 20(1): 29-37. 1939.—A study of differences in water loss and soil moisture on north and south-facing slopes of a ridge in Monroe County, Indiana. This ridge is typical of all dissected areas in central Indiana where north slopes have beech-maple and south slopes oak-hickory forest cover. Evaporation on the S slope was 61% greater than on the N slope. Surface soil had 30% and soil at 6 in. depth 28% more moisture on the N than on the S slope.—J. E. Potzger.

3512. REGEL, C. Pflanzensoziologische Studien aus dem nördlichen Russland. VI. Beitr. Biol. Pflanzen 25(2): 169-227. 1938.—An ecological study of 2 regions in northern Russia was made. The first area lies between the cities of Archangel and Onega, and the sociological relationships of meadow, forest, moor, and tundra are studied and discussed. Descriptive lists of communities are included, and these areas are carefully described. The 2d area is located between the White Sea and Lake Onega, and between Pertominsk and the sea coast. The communities are descr., and the effects of man's activity on these communities is also

mentioned .- M. Hopkins.

3513. SCHARFETTER, RUDOLF. Des Pflanzenleben der Ostalpen. xv+419p. 73 fig. Franz Deuticke: Wien, 1938. Pr. 25.80 glid.—The region is bounded by the Danube and Po on the north and south respectively, a line running through the Lake of Constance and Lake Como on the west, and an irregular one from Pressburg through Agram and Laibach to Trieste on the east. The treatment is technical, requiring for its comprehension some knowledge of both terminology and facts of central European geobotany. It is based on observations during excursions over 30 years and upon a compilation of data from over 1000 references. Chapter 2 (35pages) shows some of the various ways in which the region has been or might be subdivided according to floristic, climatic, sociological, and successional points of view. In the discussion of the vegetation, the communities are grouped according to their floristic affinities into 5 divisions: Mediterranean, the Illyrian, Pannonian, Baltic, and alpine floras. The last chapter (61pp.) traces the migrations and development of the flora and vegetation from early Tertiary time to the present. The bibliography includes sections on geographic works, floras, geobotanical reference works, monographs and maps as well as complete

literature citations. The 73 text figures consist almost entirely of graphs, sketches, and small maps. The appended map, in black and white, shows in considerable detail the boundaries of 20 vegetation formations and 3 agricultural regions.—C. E. Olmsted.

3514. SØRENSEN, THORVALD. Ranunkelstudier. I. Om Vackst og Hvile hos nogle danske Ranunkelarter. II. Om Variation og Nedarvningsforhold hos Ranunculus auricomus L. [Studies on Ranunculus. I. Growth and rest in some Danish spp. of Ranunculus. II. Variation and heredity in R. auricomus.] Bot. Tidsskr. 44(3): 307-335; (4): 433-438. 1938.—I. Within the genus Ranunculus typical representations. sentatives of plants with a summer rest period and plants with a winter rest period occur in Denmark. The nature of the rest periods was studied experimentally by cultivation in greenhouses in the winter and in the open during the summer. The rate of growth during the rosette stage was detd. from the number of leaves, and during the following stages from the number of shoot generations. As regards spp. with an induced winter resting period, a distinction is made between 2 growth types: the "annual" type with a constant growth rate, and the "biennial" type, in which the growth rate decreases as the fruiting stage approaches. No absolutely autonomic winter rest was found, though a reduced rate of growth was found in certain spp.; this was regarded as an expression of an intermittent "semi-rest." It is probable that the resting period of the spp. that are dry in summer is not autonomic, but induced by want of moisture and light.—The appendix deals with observations on attacks by Aphididae and their possible importance as determining factors for the ecological demands and geographical distribution of certain spp. of Ranunculus.—II. Investigations on the variability of a number of Ranunculus spp. within delimited populations showed that the variation in R. auricomus is of a different character from that in the in *R. aurocomus* is of a different character from that in the other Danish *Ranunculus* spp. reproducing by seed. Populations of *R. a.* either exhibit no variation, or are composed of a few well-defined types. Hybridization experiments with such easily recognizable types demonstrated that the constancy of the types is due to pseudogamy. Pseudogamous reproduction in *R. a.* and *R. cassubicus* was previously demonstrated by Rozanova, whose results are here referred to. The partial pollen sterility associated with the pseudogamy aids in distinguishing between Arctic forms of R. auricomus and R. affinis, whose systematic position has hitherto been uncertain.—Th. Sørensen.

3515. STEFFEN, H. Gedanken zur Entwicklungsgeschichte der arktischen Flora. Beih. Bot. Centralbl. Abt. B 58(2): 141-202. 4 fig. 1938.—The first stage in the development of an arctic-alpine floral element appears to be scarcely any more recent than the arctic flora itself. The question as to the particular glacial period in which certain spp. came to the Alps and other high mountains is discussed as is also the paths of the arctic-alpine floral migration in Europe. To show the influence of different mountains on the fiora of particular sectors of the polar region spp. are listed according to the mountain region in which they probably originated and from which they have spread out into the Arctic area. Other lists of spp. which were developed in the arctic or subarctic but which had their origin in the mountains are given. Comments on the probable origin of particular spp. are made in an appendix. Tundra and steppe are shown to be closely related in having certain common ecological characteristics and spp. common to the two formations are listed. At least a diluvial, apparently an old diluvial age, is to be assumed for the relations between steppe and tundra. A floral exchange between steppe and tundra may have occurred by way of high mountain formations or along the larger streams. A few corrections and supplements for the distribution of several spp. are appended.—H. F. Bergman.

3516. WEIMANN, G., und TRG. SCHULZE. Pflanzensoziologische und pollenanalytische Untersuchungen in der Tschocke bei Liegnitz (Schlesien). Beitr. Biol. Pflanzen 25(1): 60-74. 3 fig. 1938.—The Liegnitz district, a type of moor, lies 25 km. east of the town of Kuntz. Today the vegetation cover has become flat moorish vegetation abounding in peat, and is of a most monotonous character. The vegetational layers and plant communities are de-

scribed. Tschocke is an area preserved and protected for scribed. Isomorae is an area preserved and protected for conservation, and offers an excellent region for pollen studies. It is compared with other communities studied by Koch. Figures and charts illustrating the types of pollen found in the bogs are included. Pollen of Abies, Picea, Pinus, Carya, Betula, Quercus, and Alnus was found,-M. Hopkins.

3517. WIGGINS, IRA L. Hanging gardens of the Canary Island date palm. Madroño 4(8): 260-263. 1938.—The petiolar bases of the canary date palm support a flora of 30 spp. of annual, and perennial flowering plants and ferns. Seeds lodge in the pockets through the agency of wind, gravity, animal carriers, and direct contact of fruiting plant with the trunk of the tree. Some oak seedlings 9 years of age have been observed in these petiolar cups.—I. L.

Wiggins.

3518. WIINSTEDT, K. Vegetationen paa Reservatet Vorsö i Horsens Fjord. [The vegetation of the reservation Vorsö in Horsens Fjord.] Bot. Tidsskr. 44: 260-306. Map. The small island of Vorsø in Horsens Fjord, Jutland, and the surrounding islets, cover an area of about 59 ha., some 43 ha. of which have been set apart as a nature reserve. In the preserved area 3 sample plots, each measuring 400 sq. m., and several fixed lines, all distinctly marked, have been laid out, to facilitate future investigations. The vegetation of one sample plot was examined in great detail, the vegetation of each sq. m. being noted down.
Despite the short space of time (6 years) during which
the investigations were carried out, it was possible to ascertain changes in the composition of the vegetation of the marked areas, resulting from competition, gradual altera-tion of the soil, and immigration from the 2 small woods found on the island. Thus certain patches were covered with a luxuriant growth of Acer pseudoplatanus and will no doubt in the course of years develop into a wood. On field areas set apart as a reserve, fairly great changes will immediately take place, since the field weeds will be ousted by vigorous spontaneous perennating spp. The paper also gives a complete list of the vascular plants found on the island, and lists the spp. of each community and area of investigation.—K. Wiinstedt.

OCEANOGRAPHY

(See also in this issue Entry 4718)

3519. GRØNTVED, JUL., and GUNNAR SEIDENFADEN. The phytoplankton of the waters west of Greenland. Meddelelser om Grønland 82(5): 1-380. 2 pl., 108 fig. 1938.— This is chiefly a taxonomic and distributional study of the various spp. of phytoplankton collected during the God-thaab expedition in 1928. The distribution of the more important forms is indicated on maps and their relative abundance is shown in the tables. Also the composition of the different plankton communities encountered in the different water masses is discussed, and an attempt is made to correlate the plankton variations with the circulation of the water. The distribution of these plankton communities seems to support in all essential details the assumptions of hydrographers with regard to the course of the sea-currents in this region.—C. Juday.

3520. KEMP, STANLEY. Oceanography and the fluc-

tuations in the abundance of marine animals. Rept. Brit.

Assoc. Adv. Sci. 108: 85-101. 1938.
3521. PARR, A. E. On the possibility of a biological mechanism controlling the occurrence of the oxygen minimum layer in the sea. *Proc. Amer. Philos. Soc.* 80(1): 49-56. 1939.—A consideration of the densities of plankton particles detd. by Seiwell and Seiwell (1938) indicates that no reasonable or even possible thermal expansion coefficient for such particles would permit them to find a level of equivalent density in the surrounding medium of a natural ocean, at which such particles would accumulate and create an increased oxygen consumption for their decomposition. A consideration of other factors involved in the settling and decomposition of plankton organisms also points quite definitely in the same direction on the basis of the density determinations of Seiwell and Seiwell. If other organic particles should occur with a density differing in so slight a degree from the density of the medium that equivalent densities might be reached at deeper

levels, this condition, with its attendant accumulation, must be attained at or above the level of greatest potential density of the surrounding seawater, that is, at or above the salinity maximum level. Since this is situated above the oxygen minimum layer, the possibility of explaining the latter by an accumulation of decomposing plankton particles seems excluded .- Auth. abst.

LIMNOLOGY

3522. BÜREN, G. von. Das plankton. In his Der Amsoldingersee. Mitteil. Naturforsch. Ges. Bern 1937: 87-96. 1938.—These plankton observations covered a period of 4 yrs. (1933-37). The phytoplankton was most abundant in the 3-5 m. stratum. It consisted of 5 blue-greens, 5 flagellates, 4 peridinians, 7 diatoms and 6 green algae. The quantity of material was fairly evenly distributed throughout the year and no limiting factor to its production was found. Blue-green and green algae were most abundant in summer, but diatoms were dominant in winter. 2 spp. of Ceratium were abundant between Apr. and Oct. The zooplankton consisted of 1 ciliate, 9 rotifers, 3 cladocerans and 2 copepods. The ciliate, most of the rotifers, *Diaphanosoma* and Diaptomus were most numerous in summer; Anuraea and Bosmina were taken in considerable numbers in winter. In their vertical distribution the rotifers and cladocerans were confined chiefly to the epilimnion, but *Diaptomus* was somewhat deeper, chiefly in the thermocline. Down to a depth of 10 m. the total volume of plankton ranged from 5.2 to 26 cm3 per sq. m. of surface, with a mean of 9.5 cm3 A plankton pulse was found in spring during March-April

A plankton pulse was found in spring during internation and in autumn in Sept.—C. Juday.

3523. FISHER, R. A., A. C. FABERGÉ, F. GROSS, A. G. LOWNDES, K. MATHER, E. S. RUSSELL, D. M. S. WATSON. Artemia salina. Report of the Committee appointed to investigate the progressive adaptation to new conditions in Artemia salina. Rept. Brit. Assoc. Adv. Sci.

108: 335-339. 1938.

3524. RILEY, G. A. Limnological studies in Connecticut. Ecol. Monogr. 9(1): 53-94. 1939.—Part I contains a general limnological survey of 3 Connecticut lakes, all of them small but thermally stratified in the summer. They are probably moderately productive, but it was impossible to estimate the productivity by the method of hypolimnetic oxygen deficits because of frequent photosynthetic activity in the hypolimnion. The plankton did not show a typical bimodal seasonal curve. Part II is a description of the Cucycle in the 3 lakes. The seasonal variation was large, the greatest observed range in Cu ion being from 0.004 to 0.099 mg. per liter and the total Cu 0.009 to 0.383 mg. The greatest quantities were found in the autumn. By a series of multiple correlations it was shown that there are at least 5 factors which affect Cu distribution: (a) the diluting effect of precipitation; (b) sedimentation, the removal of Cu from soln. by adsorption on organic matter; (c) regeneration from the mud; (d) liberation from decomposing littoral plants; and (e) liberation by decomposition of plants surrounding the lake. Cu had no ecological significance except during the autumn, when it was oc-casionally high enough to be toxic to some of the more delicate organisms. The tolerance level of 10 representative

delicate organisms. The tolerance level of 10 representative freshwater invertebrates was found to range from 0.03 to more than 0.5 mg. of Cu per liter.—G. A. Riley.

3525. SCHEFFER, VICTOR B., and REX J. ROBINSON. A limnological study of Lake Washington. Ecol. Monogr. 9(1): 95-143. 36 fig. 1939.—A 13-month study was made of an oligotrophic lake bordering Seattle, Washington, 50 sq. mi. in area and 214 ft. deep. Physico-chemical findings were: maximum water temp. 21.85°C at the surface in Aug.; minimum temp. 5.34° below 30 m. in Feb.; a thermocline appearing in June and reaching a depth of 15 m. cline appearing in June and reaching a depth of 15 m. by Sept.; annual heat budget 43,000 cal./sq. cm. surface; O₂ content relatively uniform at all depths with a minimal saturation of 50% near the bottom in Aug.; free CO₂ from 0.7 to 6.10 mg/l.; pH 6.8-8.6; silicate 0.8-3 mg. Si/l.; phosphate 0.000-0.025 mg. P/l.; nitrate 0.04 to 0.12 mg N per l.; N/P ratio of the water 12/1; no appreciable ammonia or nitrite; total organic material 1-2 mg./l.; total dissolved solids 50-70 mg./l. Biological findings were: average amount of dry plankton 150 mg./cu. m., with an organic component of 58 mg./cu. m. In the open-water plankton 72 phytoplankters and 35 zooplankters, or a total of 107 spp., were found. Diatoms were predominant, with pulses of growth in May and Nov. Common spp. of Crustacea were Diaphanosoma leuchtenbergianum, Epischura nevadensis, Diaptomus ashlandi, Cyclops bicuspidatus, Pontoporeia filicomis, and Neomysis mercedensis. The plankton population was much the same as 20 years ago, and resembles that of Lakes Erie and Superior. Several bottom organisms and 21 spp. of marginal aquatic plants are discussed briefly.—Authors.

3526. WEICH, PAUL S. Vertical distribution of summer temperature in the false bottoms of certain Michigan bog lakes. Ecology 20(1): 38-46. 1939.—The vertical distr. of temp. in the false bottoms of 5 northern Michigan bog lakes in summer is presented in the form of graphs and accompanying descriptions. Irrespective of the differences in the types of bog lakes studied, all of the curves have a certain fundamental similarity of form. Only the upper portions of the curves reflect the variations of atmospheric temps. In spite of marked differences in the 2 sets of conditions, there is a fundamental similarity in the form of vertical temp. curves for the bottom deposits of Lake Mendota, Wisconsin, to those presented in this paper. The usual amt. of fall in surface elevation of these bog lakes does not alter the fundamental form of the vertical temp. curve. In the deeper regions of the false bottom, temps. may differ at the same level on the same day at points at various distances apart; likewise, differences occur at similar points and levels on successive observations. Differences in the thermal conductivity of the false bottom materials probably have something to do with these temp. differences.—P. S. Welch.

3527, WHITNEY, R. J. A syringe pipette method for the determination of oxygen in the field. Jour. Exp. Biol. 15(4): 564-570. 1 fig. 1938.—The water sample to be tested is drawn into the syringe pipette and followed by the usual Winkler reagents. The resulting iodine solution is then titrated by connecting up a special burette with the pipette and drawing in the standard soln. of Na thiosulphate from the burette. The starch indicator is drawn in before connecting up the burette. The detn. can be completed in the field within 5 min. and the method is more reliable than the ordinary field method since contamination of the water sample with atmospheric air is avoided at all stages. The apparatus is compact and portable.—R. J.

Whitney.

WILDLIFE MANAGEMENT—AQUATIC (See also the section "Pisces"; and Entries 3412, 3660, 5152, 5248)

3528. BÜCKMANN, A. Über Methodik, Ergebnisse und Auswertung der Wachstumsuntersuchungen an Nutzfischen. Cons. Perm. Internat. Explor. Mer Rapp. Proces-Verbaux Reunions 108(2): x-xv. 1938.—This review summarizes current methods of studying growth rate in sole, cod, and herring in the North Sea and north Atlantic. Difficulties and sources of error in age determination, in estimating body increment from scale measurements and otoliths, along with obtaining representative samples of fishing stock in relation to size and type of net, migrations, time of spawning, etc. are discussed. The potential growth rate of a species varies in geographic races, and with age and degree of sexual maturity. It is affected by temp., food, and fishing intensity. The practical value of growth studies to the fishing industry is stressed, in maintaining a permanently high yield of commercial fish. The author expresses the need for more complete knowledge concerning the growth of the stock, the individual's growth in relation to the general character and size of the stock, and natural mortality.—J. W. Price.

3529. DAHL, KNUT. A review of recent salmon marking experiments in Norway. Cons. Perm. Internat. Explor. Mer Ripp. et Procès-Verbaux Réunions 108(3): 3-15. 8 fig. 1938.—From salmon marked in 1935, 1936 and 1937, 47, 48 and 40% were recaptured. Fish were tagged at 3 points on the west coast of Norway. Many were retaken near the point of release but long migrations were numerous, including recoveries in the White Sea, Scotland, England and

Sweden. In some instances the fish moved rapidly, one averaging 100 km. a day for 11 days. The greatly dispersed migrations involved fish released on the outer coast. Fish released inside the island belt were retaken in the rivers and fiords in the vicinity of release. Both silver and celluloid tags bearing an address and identification number were used. These were fastened through the cartilage at the anterior base of the dorsal fin with silver wire.—F. N. Clark.

3530. HUNTSMAN, A. G. International Passamaquoddy fishery investigations. Cons. Perm. Internat. Explor. Mer Jour. Conseil 13(3): 357-369. 2 fig. 1938.—A tidal power project on the U. S.-Canadian border threatened the very concentrated local herring fishery. Under an International Commission, hydrographic, phytoplanktonic, zooplanktonic and ichthyological investigations were carried on, the field work being in 1931 and 1932. The detailed reports, published in the Journal of the Biol. Board of Canada, represent an intensive attempt to relate a fishery to the physical conditions. Thorough application of current scientific methods failed to solve the problem, revealing present deficiencies in equipment for successful attack on the all-important problem of fish abundance. Arresting facts in addition to the unexplained phenomenal concentration of young herring, are (1) low total quantity but high surface abundance of deep-water plankton forms in the tide rips of the centrally placed passages, where the fattest herring are found, and (2) residual currents seen from hydrographic considerations to go past or from the region, yet drift bottles penetrate it against the prevailing winds. The problem is seen to be a matter of precise behaviour of the herring and of its planktonic food, and of the precise character of the complicated water movements that shift these animals.—A. G. Huntsman.

3531. KÄNDLER, RUDOLF. Untersuchungen über das Laichen des Ostseedorsches im Herbst. Kieler Wiss. Meeresforsch. 2(2): 272-292. 2 fig. 1938.—Although spring spawning

Laichen des Ostseedorsches im Herbst. Kieler Wiss. Meeresforsch. 2(2): 272-292. 2 fig. 1938.—Although spring spawning habits of Baltic codfish are fairly well understood, a number of hauls with Hensen's eggnet in Bornholm and Danzig basins gave astonishingly high counts of codfish eggs in September 1937, indicating the presence of a fall spawning codfish. The highest egg counts per sq. m. were obtained in the inner half of the 80 m. contour depth. The high-point of the spawning season was reached about the middle of Sept. The eggs were all from Onos cumbrius. The spawning fishes lay the eggs on the sea-bottom, whence they climb until they arrive at that stratification where the water density is comparable to their own. A comparative study of temps., salinities, and O₂ contents at various depths shows that this upward streaming brings the eggs and larvae into more favorable developmental conditions. It also shows a definite correlation with the spawning season, the adult fish apparently awaiting optimum conditions. The saline boundary of suspensibility in Bornholm was found to be somewhere between 13-14% instead of the usual 11%. This accounts for apparent egg concs. at certain depths as well as to indicate a possible racial difference. Spring spawners average between 52.5-52.6 vertebrae per fish, while fall spawners average between 52.5-52.1 vertebrae. All the data at hand indicate that there are 2 definite waves of migration to the spawning beds, and that the early and late spawning codfish are of 2 typical season

races.—W. M. Morton.

3532. MENZIES, W. J. M. Some preliminary observations on the migrations of salmon (Salmo salar) on the coasts of Scotland. Cons. Perm. Internat. Explor. Mer Rapp. et Procès-Verbaux Réunions 108(3): 17-35. 4 pl., 11 fig. 1938.—Fishermen believe that salmon move in a definite direction along the Scottish coast. Evidence from indiscriminate capture in nets shows, however, that salmon move in a straight line along shore for only short distances and these journeys are interspersed between definite on- and off-shore movements perhaps to a distance of several miles. In 1913 and 1914, 1019 salmon were marked in the inner narrows of Moray Firth and 28% recaptured. The majority of these fish were not bound for the rivers at the head of the firth but for many of the Moray Firth rivers. They evinced a roughly circular movement around the narrow part of the firth waiting for water to reach their own river. In 1915, 1773 fish were marked in Moray Firth about

35 miles north of the first exp. and 23% were recaptured. A few longer migrations occurred but in general the results confirmed those of 1913-14. In 1920, 478 salmon were marked in Thurso Bay and 14% recaptured. These showed a much more restricted movement and indicated a local stock which had finished their migration and were awaiting opportunity to ascend one of the 3 neighboring rivers. In 1921, 100 fish were marked 45 miles west of Thurso and 9 recaptured. These experienced extensive movements both east and west. In 1936, 1255 salmon were marked at Loch Inchard and 12% recaptured. The movements of these fish were widely dispersed, one being recaptured in Norway and one on the Yorkshire coast in northeast England. Many of the fish were retaken near to or within rivers. For such salmon, the parr areas of their scales were similar to the parr area of fish known to be native to the stream where the salmon were retaken. This homing instinct was further demonstrated by the scales of 3 salmon marked in Norway and recaptured in Scotland; one showed characteristic parr marks of the Forth and one of the Tweed. In 1937, fish were marked 20 mi. south of Loch Inchard and 13% recaptured. The results practically duplicated those of the previous year. The facts at hand leave no doubt that salmon taken in the commercial fisheries along the coasts of Scotland are on their way from feeding grounds to fresh water. Because of scarcity of salmon taken in the intensive fisheries of the North Sea, this area may be excluded as a salmon feeding ground. Present indications are that the salmon return from feeding grounds along a route to the north or northwest of the British Isles.—F. N. Clark.

3533. TANING, A. VEDEL. Migrations of small Halibut marked in Faroese waters. Cons. Perm. Internat. Explor. Mer Jour. Conseil 13(3): 370-375. 1 fig. 1938.—A preliminary report of results of marking exps. on small Halibut (Hippoglossus vulgaris) in the Faroe Area, where such exps. have not been carried out previously. About 70 specimens ranging from 38 to 62 cm. in length were tagged and liberated in fjords of the Faroes during July and Aug. 1937. During 14 months 18 (26%) were recaptured and of the recaptured individuals 5 specimens had left the area and had migrated to Iceland (4 specimens) and to the central North Sea (1 specimen). Whether the migration is caused by inception of maturity or some other stimuli is not certain, as the size at the beginning of maturity is not known with certainty in this area, the spawning places being situated west of the Faroes in the great bight of the North-Atlantic off Scotland-Faroe-Iceland.—A. V. Tåning.

WILDLIFE MANAGEMENT-TERRESTRIAL

(See also the section "Aves"; and Entries 3414, 4678, 4681, 4760, 5096, 5220)

3534. BRADT, GLENN W. A study of beaver colonies in Michigan. Jour. Mammal. 19(2): 139-162. 1938.—Methods of live trapping, branding, and determining sex of beavers were developed. The number of beavers per colony is 1 to 12; the average, for the 57 colonies studied intensively, was 5.1. The number of beavers per lodge is not a satisfactory unit for use in estimating beaver populations over extended areas. The number and size of beaver dams afford little indication of the number of beavers present. The "typical" beaver colony consists of a family, including the 2 parents, the yearlings born the previous year, and the kits of the current year. Every member of the colony aids in maintaining the colonial dams. average number of beavers born per litter is between 3 and 4. There is 1 litter per year. The sexes are approx. equal in number in the beaver, the number of 33 slightly exceeding the number of 92. The beavers studied cut between 200 and 300 trees each per year. One acre of popular (aspen) should support an average beaver colony from 1 to 2.5 years. Yearlings are permitted to remain in the colony, but the 2year-old beavers leave or are driven from the home colony shortly before the birth of the 2d annual litter. In migrating, beavers may undertake long overland journeys. The emigration of the 2-year-old beavers provides a method of dispersal, and tends to establish new colonies in areas not previously stocked with beaver. The size and composition of beaver colonies is such as to permit the efficient and

economical use of food supplies adjacent to small bodies

of water.—Auth. summ.
3535. DARLING, F. FRASER. A herd of red deer; a study in animal behavior. x+215p. 4 maps, 7 pl., 10 fig. Oxford University Press: London, 1937. Pr. \$5.50.—This book recounts in simple plan the results of a 2-year study of the red deer of an area in N.W. Scotland. It contributes greatly to the understanding of the largest game animal of Great Britain. The red deer is a species closely related to the American wapiti, and in this part of Scotland at least it may be considered as having throughout several hundred years attained an ecological balance in respect to man such as today is hardly to be encountered among the wapiti of America, harassed as they are by the curtailment of either winter or summer range, or both, and by political considerations and demands of sportsmen. Of particular value are the data upon the reactions of the deer to sudden value are the data upon the reactions of the deer to sudden changes in temp., humidity, and other environmental conditions—data that may, with profit, be used as yard-sticks in the study of the deer of other areas throughout the world. Technique and equipment are usefully described—the author found he could do stalking best when barefoot—the whole threshold of awareness was raised. Territory and population are treated under the divisions of winter, summer, and breeding territories; deer paths, wallows, and rubbing trees, and the social groups of hinds, stags, and harems. The social organization is matriarchal; hinds, not stags, are the leaders of family groups, of which the stags are only temporary members. Voice and play are stags are only temporary members. Voice and play are described and general sociality discussed and to some extent compared with that of the roe deer and feral goats and sheep. There are chapters on movement as influenced by meteorological factors, insects, and food supply. Reproduction is treated in detail and the senses are discussed and appraised. Theoretical considerations receive attention throughout. There is a glossary of Gaelic place names, a succinctly annotated bibliography extending over 5½ pages, and a good index.-Courtesy Jour. Mammal. and Wildlife Remen

3536. ERRINGTON, P. L., and M. McDONALD. Conclusions as to the food habits of the barred owl in Iowa. Iowa Bird Life 7(4): 47-49. 1937.—Nestling young of the Iowa barred owl (Strix varia) seem to be fed the same sort of food that is eaten by the adult owls, except for very small prey, such as insects, which the adults apparently eat upon capture and rarely carry to the nest. Virtually any animal living in the owl's habitat, from insects to the largest vertebrates within its power to kill, may fall victim, observations in Iowa and Wisconsin showing such items of interest as the kingfisher (Megaceryle alcyon), bat (Myotis grisescens), and small mink (Mustela vison). Of the prey species occurring in the barred owl's diet, only the bobwhite (Colinus virginianus) has been thoroughly studied from the standpoint of population on the same areas where the barred owl work was done. Excess bobwhites are usually eliminated by the far more formidable horned owl or the Cooper's hawk (Accipter cooper), but, in the event of scarcity or absence of these owls and hawks, a compensating elimination seems to take place through the medium of weaker or clumsier predators, the barred owl included.— Courtesy Exp. Sta. Rec.

3537. McATEE, W. L. Wildfowl food plants. Their value, propagation, and management. ix+141p. 17 pl., 4 fig. Collegiate Press, Inc.: Ames, Iowa, 1939. Pr. \$1.50.—This book discusses briefly the productivity, food value, and utilization by wild fowl of aquatic plants. The longest chapter treats important food plants by families, giving notes on their variety, recognition, ecology, and use by waterfowl. Chapters are devoted to environmental limitations on the growth of aquatic plants, as illumination, fer-tility, quality of water, and pollution; to planting suggestions including storing and handling, together with recommendations of plants for particular environments; to construction of ponds for various sites and preparation of planting areas; and to control of undesirable plants and animals. There is also a glossary of vernacular names of wild fowl food plants, a bibliography of 37 titles, and a 15-page index.—W. L. McAtee. 23538. MOFFITT, JAMES. Eighth annual black brant census in California. California Fish and Game 24(4): 341-346. 1938.—In point of total numbers, the 1938 census of black brant in California was about average for the 8 seasons in which counts were made. Humboldt, our most important brant bay, had more than usual numbers present at census taking time and a tremendous conc. a month later. Here, the 1938 figures exactly doubled the previous year's, one of light visitation. The aggregate total for Bodega, Tomales, and Drake's bays was somewhat under the 1932-1936 average for the region, but an incomplete census was probably obtained at Tomales Bay this year and the deficiency might make up the difference. The Morro Bay 1938 result was close to counts obtained the previous 2 seasons, but twice as many birds were reported present 2 weeks before census taking. While somewhat lower than in 1937, the Mission—San Diego Bay aggregate of 722 brant indicated that numbers of the birds have become reestablished there after years of absence.—I. Moffitt.

established there after years of absence.—J. Mosfitt.

3539. NELSON, A. L., TALBOTT E. CLARKE, and W. W. BAILEY. Early winter food of ruffed grouse on the George Washington National Forest. U. S. Dept. Agric. Circ. 504. 1-37. 28 fig. 1938.—A preliminary economic study by the Bureau of Biol. Survey to provide a scientific basis for forest-game management on the George Washington National Forest, Virginia and West Virginia, disclosed that 20 plants are outstanding sources of food for ruffed grouse in early winter. These plants furnished about \$5% of the contents of 185 stomachs collected, chiefly by hunters, in Nov. and Dec. 1935 and 1936. Herbaceous plants supplied about \$1 of the food, shrubs and vines each about \$1 and trees the remainder. The habitats of the 20 plants also were studied. The results, shown in tables and graphs, indicate that wooded areas with open canopies and with soils sufficiently productive for the growth of mixed stands of shrubs and vine thickets furnish the best feeding grounds. The early winter food plants, which are probably equally useful to grouse throughout the winter, are illustrated in normal winter condition for purposes of identification, as their winter appearance may be quite different from their showy summer appearance. This will be of help in setting

up C. C. C. projects for improving grouse habitats in this

and adjacent forests.—A. L. Nelson.

3540. PALMER, RALPH S. Late records of caribou in Maine. Jour. Mammal. 19(1): 37-43. 1938.—A summary of most of the literature, and a questionnaire circulated to game wardens, revealed that the Woodland Caribou (Rangifer caribou caribou) probably was extirpated in Maine not later than 1910 as a result of occupation of the land in conjunction with lumbering, extensive forest fires, and overshooting. Restocking with this species would probably be inadvisable.—R. S. Palmer.

3541. TRAVIS, BERNARD V. The fire ant (Solenopsis spp.) as a pest of quail. Jour. Econ. Ent. 31(6): 649-652. 1938.—Fire ants are destructive to quail; they enter the pipped egg and consume the chick before it can escape from the shell. As many as 15% of the quail nests were destroyed even when the nearby colonies of ants were fumigated with NaCN. NaCN (1 ounce to 1 gallon of water) and dry NaCN (1 oz. to each colony) have been used as control measures. The respective percentages for inactive colonies 3 months after the treatments were 66 and 53. Repeated applications of the cyanide soln. not only failed to eradicate ants, but appeared to more than double the number of colonies present in a given area. There was, however, a large numerical reduction of the ants. 58% of the colonies from which queens were removed remained active and continued to produce young. One colony migrated 117½ feet, 105½ of which was subterranean. Exps. in cages were made difficult by the ability of the ants to cut their way out of ordinary formicaries. Poisoned baits have not shown much promise as a method of control.—

B. V. Travis.

3542. WILCOX, A. N., et al. The search for natural history areas in Minnesota. Report of the Committee on the Preservation of Natural Conditions. Proc. Minnesota Açad. Sci. 6: 20-25. 1938(1939).—The Committee has located several areas preserved in approx. their primeval condition. Plans are under way to preserve a 1300-acre tract of virgin hardwood timber in Rice County, Minnesota. Other smaller areas of natural interest are to be preserved according to plans of the Committee.—H. K. Wilson.

WINDSHIP OF THE STATE OF PALEOBOTANY

EDWARD W. BERRY, Editor

(See also in this issue Entry 4887)

BERTRAND, P., et P. CORSIN. Comment l'examen d'une seule section transversale de la tige permet de comprendre l'organisation, l'ontogénie et la phylogénie d'une plante ancienne. Ann. Sci. Nat. Bot. 19: 25-31. 3 fig. 1937.—A general idea of the vascular organization of an ancient plant may be gained from a suitably chosen transverse section. Such a section permits classification, determination of affinities and indicates some of the essential steps in its evolutionary history. Ferns and phanerogams have diverged greatly during geologic time, and if they had common ancestors, they could have been none other than simple forms like the Rhyniales of the Devonian.— C. A. Arnold.

4723. GRAHAM, ROY. Suggestions regarding the taxonomy and nomenclature of Cretaceous and Tertiary plants. Jour. Paleontol. 13(1): 122-125. 1939.—The difficulties of nomenclature and taxonomy of fossil dicotyledons are discussed. Confusion and uncertainty caused by ascribing, on insufficient evidence, fossil leaves to modern genera could be eliminated by the use of form genera; and redundancy of species by taking into account variation within the species. The value of the ecological approach is pointed out. A thorough revision of fossil dicotyledon floras and

floral lists appears long overdue.—R. Graham.
4724. KIRCHHEIMER, FRANZ. Beiträge zur näheren Kenntnis der Mastixioideen-Flora des deutschen Mittelbis Oberoligozans. Beih. Bot. Centralbl. Abt. B 58(3): 303-375. 6 pl., 5 fig. 1938.—In definite layers of the German Tertiary plant fossils occur, which are to be regarded as the remains of the so-called Mastixioideae flora. Remains of Mastixioideae fruits occur especially in the lignite strata of Germany hitherto considered mostly as Miocene. Besides Mastixia extinct genera related to it have been discovered through innumerable remains in many places. Among the accompanying forms are Keteleeria and Tetrastigma which until now were still unknown from the older Tertiary of Germany; of those known also from the later Tertiary Sciadopitys, Magnolia, Cinnamomum, Nyssa, Symplocos and palm remains may be mentioned. 2 spp. of Myrica, Tetrastigma chandleri*, XYLOMASTIXIA with X. lusatica*, RETINOMASTIXIA with R. schultei*, and Symplocos pseudogregaria* are new. Remains of the Mastixioideae and the indicator forms are not found in definitely dated Miocene strata of Germany and therefore had already died out during the Oligocene. Accordingly the strata in which they are found are assigned to the Middle to Upper Oligocene. The extinction of the Mastixioideae before the beginning of the Miocene may have had climatic causes and may be correlated with the beginning regression of the ocean in the Middle Oligocene. The Mastixioideae flora is considered as native in Europe contrary to an opinion according to which the closely related Eocene flora must have wandered in from the Indomalayan region.

—From auth. summ. (tr. by H. F. Bergman).

4725. MÜLLER-STOLL, WOLFGANG R. Die jüngsttertiäre Flora des Eisensteins von Dernbach (Westerwald). Beih. Bot. Centralbl. Abt. B 58(3): 376-434. 7 pl., 9 fig. 1938.—The results of a reinvestigation of the Ludwig collection of fossils from tertiary strata east of Dernbach near Montabaur in Westerland and of several specimens from another collection are presented. The location, distribution, geologic age, and lithographic character of the strata are discussed as is also the state of preservation of the plant remains which in most specimens was unusually good. The most important plant in the flora of the Dernbach strata is Juglans globosa. Other forms occurring in the flora are listed. There can be no doubt but that the Dernbach flora is of Pliocene age and indeed belongs in the Upper Pliocene. A description of the fossils of the more important plants of the flora in the Dernbach strata is given. For Coniferae this includes epidermal structure and morphology of the needles; for other plants morphology of leaves and morphology and structure of fruits. Botanical affinities of each fossil sp. and geologic strata in which each sp. or related form occurs are also discussed. *Picea* palaeomorika, P. echinata and Carpolithus cistoideus are new .- H. F. Bergman.

4726. REED, FREDDA A. Notes on some plant remains from the Carboniferous of Illinois. Bot. Gaz. 100(2): 324-335. 19 fig. 1938.—Fragments of a stem, leaves, and sporangiophores bearing sporangia containing spores, all hitherto undescribed species and all possessing Calamitean characters, were found in coal ball 236 of the Harrisburg, Illinois, collection. The geological age of the material is the Alleghany group of the Upper Pennsylvanian. In its anatomical structure the stem is conformable with the genus Calamites, but varies in detail from any of the described species, and so the specific name multifolia has been assigned to it. Many sections of Calamitean leaves were found, some of them remarkably well preserved. In general they resemble leaves of the Asterophyllites type of the British Coal Measures, yet differ from them in specific details to such an extent that they too have been assigned to C. multifolia. The sporangiophores are all detached from any vegetative structure and are separated from one another, except in one instance where 2 of them were found so related as to suggest an original aggregation into a strobilus. They are unique in the number (25-30) of sporangia they bear. The sporangia are round to angular in section, with a single layer of wall cells, and contain numerous spores. The spores are elliptical to elongate, $25 \times 50~\mu$, with smooth spore coats and devoid of contents. The fragments described may possibly be vegetative and reproductive por-

tions of the same plant.—Auth. summ.

4727. ULKE, TITUS. A new genus and species of fossil
Algae. Torreya 38(3): 57-62. 6 fig. 1938.—GLOBULINEA
giganteus, Salem limestone of Indiana.—M. A. Rice.

ALGAE

(See also in this issue Entries 3413, 4727, 4793)

4728. ENGLERTH, HARRIET W. Pits in the Hapteres of Nereocystis. Bot. Gaz. 100(2): 370-373. 5 fig. 1938.—Cross and longitudinal sections of hapteres and lower stripe of Nereocystis were cut and stained. Pits occur in practically all cells of the stipe and in all cells of the hapteres. Each pit is crossed by a thin membrane which may be overlooked without the modification in fixing and staining technique as described.—H. W. Englerth.

4729. KYLIN, HARALD. Verzeichnis einiger Rhodophyceen von Sidafrika. Lunds Univ. Arsskr. Avd. 2 34(8): 1-25. 8 pl., 10 fig. 1938.—Annotated list of spp. in material collected by T. A. Stephenson, containing 18 "new species" and 3 "new genera" without Latin descriptions; Gelidium reptans (Phyllophora r. Suhr); Streblocladia corymbifera

(Hutchinsia c. Ag.); Grateloupia longifolia (Schizymenia undulata J. Ag.).—F. Drouet.

4730. McINTEER, B. B. Distribution of the algae of Kentucky in relation to soil regions. Castanea Jour. So. Appalachian Bot. Club 3(3): 32-35. 1938.

4732. THOMPSON, R. H. A new genus of algae in the family Scenedesmaceae. Amer. Jour. Bot. 25(9): 692-694. 10 fig. 1938.—In July, 1937 and 1938, a new planctonic alga, CORONASTRUM aestivale, was found in water, highly polluted with fecal material, in a drainage ditch in Lawrence, Kansas, It appeared only during periods of hot weather without rain. The new genus is near Crucigenia and Hofmania.-R. H. Thompson.

YNAFUNGI

Editor: C. L. SHEAR. Associate Editor: EDITH K. CASH

(See also in this issue Entries 3504, 4427, 4634, 4635, 4636, 4637, 4638, 4639, 4641, 4642, 4643, 4644, 4645, 4646, 4714, 4793, 4963, 5014)

FUNGI

4733. BAUCH, ROBERT. Über die systematische Stellung von Tilletia sphagni Nawaschin. Ber. Deutsch. Bot. Ges. 56(2): 73-85. 1938.—The spore membrane of "T. sphagni" has a different structure from that of most other smuts. The spores arise in a compact, septate, monocaryon mycelium which is parasitic on the sporogonium and terminal bud of Sphagnum and can be cultured in pure form. Spore formation takes place only in the spore sac of the sphagnum moss after reduction has taken place. The Disco-mycete form appears later on the moss leaves. The ascospores of the apothecia produced pure cultures which were identical with the mycelium produced by the spores formed in the moss heads. The author concludes that "Tilletia sphagm" is the conidial form of Helotium schimperi.—H. C. Beeskow.

4734. BRASFIELD, TRAVIS W. Tropical Dacrymyce-

4734. BRASFIELD, TRAVIS W. Tropical Dacrymyce-taceae. Lloydia [Cincinnati] 1(1/4): 153-160. 1 pl. 1938 (1939).—N. spp. are descr. in Arrhytidia (1, Panama), Dacrymyces (1, Panama), Calocera (1) Philippines, on Pinus insularis, Dacryomitra (1, Panama).

4735. GREIS, HANS. Die Sexualvorgänge bei Tuber aestivum und Tuber brumale. Biol. Zentralbl. 58(11/12): 617-631. 3 fig. 1938.—The sexual processes in these 2 species are identical. The nucleus from the cell of one hypha enters a cell of another hypha so that the conulation cell contains are identical. The nucleus from the cell of one hypha enters a cell of another hypha, so that the copulation cell contains a pair of nuclei, and these by more or less synchronous division transform the cell of fusion into a single ascogenous hypha. By the formation of transverse walls the hypha becomes divided into cells, each with a pair of nuclei. The asci may arise from the end cells and also from the intercalary cells of the ascogenous hyphae.—A. H. Hersh Hersh.

4736. HAWKER, LILIAN E. Effect of growth substances on growth and fruiting of Melanospora destruens. Nature [London] 142(3606): 1038. 1938.—Negligible growth and no perithecia were produced on a medium containing glu-cose, KNO₃, MgSO₄ and KH₂PO₄. Good mycelial growth was made when "biotin" (a growth substance obtained from egg-yolk) was added to the medium. Growth and perithecial production were both good if biotin and aneurin were added to the medium.—E. Oyler.

4737. MURRILL, WILLIAM A. Additions to Florida fungi. I. Bull. Torrey Bot. Club 66(1): 29-37. 3 fig. 1939.—New spp. are described in Agaricus, Pluteus, Venenarius, Lactaria, Galactopus, Gymnopus, Gyroporus and Poria. Notes and illustrations are included of Ganoderma curtisii

and G. sulcatum.-W. A. Murrill.

Strategy Commencer

4738. RICE, MABEL A. Rust Fungi in Norton, Massachusetts. Torreya 38(4): 81-98. 1938.—A description of 26 spp. of rusts with discussion of various problems in the field of the Uredineae which are connected with these species. -M. A. Rice.

4739. SMITH, ALEXANDER H. Common edible and poisonous mushrooms of southeastern Michigan. Cranbrook Inst. Sci. [Bloomfield Hills, Michigan] Bull. 14. 1-71. Frontispiece, 15 pl., 8 fig. 1938.—A popular guide to the most common species, with brief discussions of mushroom structure, collecting and cooking. Keys to families and

genera are given. 44 spp. are described, chiefly agarics, 29

genera are given. 44 spp. are described, chiefly agarics, 29 of them illustrated by plates.—E. K. Cash.

4740. SYLVIA, (SISTER) M. Some higher fungi in the Vicinity of Winona. Proc. Minnesota Acad. Sci. 6: 30-36. 1 fig. 1938(1939).—Some 126 specimens of Ascomycetes and Basidiomycetes collected in the vicinity of Winona, Minnesota, are listed and descr. Among the Basidiomycetes were 47 spp. of mushrooms.—H. K. Wilson.

4741. WITTLAKE, E. B. Hymenial organization of Sebacina calcea. Univ. Iowa Stud. Nat. Hist. 17(8): 351-361. 2 pl. 1938.—In the hymenium of S. calcea the widely spaced basidia are interspersed between gloeocystidia and spaced basidia are interspersed between gloeocystidia and 3 kinds of paraphyses, many of which originate from the same hyphae which bear basidia. In addition to the small crystals produced by the slender paraphyses, larger concretions form one or more irregular layers near the base of the fructification. Nuclear fusion and division follow the usual sequence of events as previously described for

this and related spp. n=8 (apparently).—Auth. summ.

4742. WOLF, FRED T., and FREDERICK A. WOLF. The snail Polygyra thyroidus as a mycophagist. Bull. Torrey Bot. Club. 66(1): 1-5. 1 fig. 1939.—This snail ate Microsphaera almi on lilac, leaving a feeding track of peculiar and characteristic design on the leaves. Similar tracks were found on crustose lichens and on the sporophores of Polyporus picipes. Under laboratory conditions, P. thyroidus ate Uncinula australiana on Lagerstroemia indica, Erysiphe cichoracearum on Zinnia elegans, E. polygoni on Trifolium pratense, making similar markings. It also consumed Fuligo septica, Hypomyces lactifluorum on Russula sp., Sticta herbacea, Cantharellus aurantiacus Boletus sp., Lactarius piperatus, Russula emetica, R. virescens, and Amanita

verna .- Auth. summ.

MYXOMYCETES

4743. MARTIN, G. W. Additional myxomycetes from Panama. (Contrib. from the Bot. Lab.) Univ. Iowa Stud. Nat. Hist. 17(8): 347-350. 1 fig. 1938.—7 spp. are added to previous records, making a total of 75 spp. known from Panama. Didymum intermedium* Schröt. is redescribed.— G. W. Martin.

LICHENES

4744. FULFORD, MARGARET. The Cladoniae of eastern Kentucky. Lloydia [Cincinnati] 1(1/4): 161-167. Map. 1938(1939).—An annotated list.

4745. SIPE, FRANK P. Lichens of the Upper Willamette Valley. Bryologist 42: 12-16. 1939.—Paper contains a list of the more common lichens of a small and homogeneous

area of western Oregon, with brief notes on usual habitat of each.—F. P. Sipe.

4746. TORREY, RAYMOND H. Collecting Cladoniae on Martha's Vineyard and Nantucket Islands. Torreya 38(3): 67-71. 1938.—Comparisons of Martha's Vineyard collection with *Cladonia* of Long Island. For Nantucket the collection

with Cladonia of Long Island. For Nantucket the collection gives the first Cladonia records under modern classification.—M. A. Rice.

4747. TORREY, RAYMOND H. Collecting Cladoniae in Maine and Quebec. Torreya 38(5): 116-120. 1938.—The collection of a 2-weeks' trip of the Torrey Botanical Club, July 2-18, 1937.—M. A. Rice.

BRYOPHYTA

A. LERUY ANDREWS, Easter (See also B. A. 13(2): Entries 1672, 2822, 2903)

4748. GROUT, A. J. Moss flora of North America, north of Mexico. 1(3): 137-192. 22 pl. Publ. by the author: Newfane, Vermont, 1938.—This fascicle includes a complete systematic account of all the species of the Encalyptaceae (by SEVILLE FLOWERS), the Buxbaumiaceae, and the

first 2 subfamilies (Pleuroweisieae and Trichostomeae) of the Pottiaceae (*Tortella* by INEZ M. HARING; *Barbula* and *Didymodon* by WILLIAM C. STEERE). For each species is given a full, original description, supplemented with critical, comparative notes. The most important

synonyms, especially those originating from American specimens, are given, as well as citations to all illustrations and Exsiccati. Keys are furnished to all spp. of each genus, and to the genera of each family. 2 supplementary keys and to the general of each family. 2 supplementary keys are included: a key to sterile specimens of *Encalypta*, and a key to the genera of the Trichostomeae. Illustrations, some original and some taken from earlier, mostly European works, are furnished for all species not previously illustrated in Grout's "Mosses with Hand-Lens and Microscope." New names, combs. or spp. are proposed in Encalypta, Buxbaumia, Anoectangium, Astomum, Weisia, Trichostomum, Timmiella, Leptodontium, Barbula, and Didymodon. The new combs. represent transfers from the genera Molendoa, Phascum, Gymnostomum, Hymenostomum, Tortula, and Zygodon.—W. C. Steere.

4749. HARING, INEZ M. A collecting trip on Mount Monadnock, New Hampshire. Bryologist 42: 28. 1939.—A new comb. in Rhacomitrium and one in Oncophorus are

proposed.-W. C. Steere.

4750. LITTLE, ELBERT L. Jr. Hepaticae of Sierra Ancha, Arizona. Bryologist 42: 23-27. 1939.—16 spp., 5 of them new state records, are listed, with ecological notes .-E. L. Little, Jr.

4751. MEYLAN, C. Glowacki's Pseudoleskea illyrica and related species. Ann. Bryol. 11: 90-93. 1938.—P. illyrica is closely related to P. radicosa. It is, however, only a vicarious race or sub-species, generally arboreal, more or less endemic

in Jugoslavia and the Appenines, where P. radicosa seems to be lacking. P. illyrica also resembles P. denudata in its middle foliary tissue. P. denudata as well as P. stenophylla are also only races of the collective species which comprises P. radicosa, P. illyrica (P. saviana), P. stenophylla and P. denudata.-P. Briscoe.

4752. PAGAN, F. M. A preliminary list of the Hepaticae of Puerto Rico including Viegues and Mona Island. Bryologist 42: 1-12. 1939 [to be continued].—A systematic list of all the spp. of Hepaticae known from Puerto Rico. including the citation for each sp., a list of the known specimens, with collection data, and the present distribution outside of Puerto Rico. New coms. in Riccardia result from transfers from Pseudoneura and Aneura; in Heteroscyphus and in Mylia, from transfers from Chiloscyphus.— W. C. Steere.

4753. STEERE, WILLIAM C. Gyroweisia tenuis in North America. Bryologist 42: 16-23. 31 fig. 1939.—The occurrence of G. t.* in N. America is established through collections made in northern Michigan. The much debated specimens collected by Drummond in 1825 at Lake Winnipeg belong to this species, and a further collection from Owen Sound, Ontario, Canada, is reported. Critical notes are given to distinguish this species from others with which it is commonly confused, especially G. calcareum*.—W. C. Steere.

PTERIDOPHYTA

C. A. WEATHERBY, Editor

(See also in this issue Entry 4796)

4754. HOLLINSHEAD, MARTHA H. Ferns of the New Jersey Pine Barrens. Torreya 38(3): 63-66. 1938.—A record

of 18 spp.-M. A. Rice.

4755. MAHABALE, T. S. Studies on the vascular cryptogams of the Bombay Presidency. 1. Distribution of the Psilotaceae, the Equisetaceae and the Lycopodiaceae with notes on the distribution of the species. Jour. Univ. Bombay 6(5): 62-75. 4 pl., 3 fig. 1938.—Distributional and ecological data on Psilotum triquetrum, Equisetum debile, and E. d. var. pashan, and 6 spp. of Lycopodium, all apparently relicts of Archean and Palaeozoic floras. Bibliography of 37 titles.—W. D. Pierce.

4756. MAHABALE, T. S. Studies on the vascular cryptogams of the Bombay Presidency. 2. Distribution of

cryptogams or the Bombay Presidency. 2. Distribution of the Ophioglossaceae with notes on the ecology of the species.
Jour. Univ. Bombay 6(5): 104-117. 5 pl. 1938.—Distributional and ecological studies of 9 spp., all geophilous and mycorrhizic, 4 of the 7 Ophioglossum spp. representing the African element, 2 the Indomalayan, and 1 cosmopolitan. The bibliography contains 44 references.—W. D. Pierce. 4757. MAXON, WILLIAM R., and C. V. MORTON. New ferns from Bolivia and Peru. Bull. Torrey Bot. Club 66 (1): 39.45 1 for 1930.—New species are described in

(1): 39-45. I fig. 1939.—New species are described in Polypodium, Blechnum, and Dicranopteris, and 3 new combs. made in Struthiopteris.—W. R. Maxon.

4758. MORTON, C. V. On the genus Cyclodium. Bull.

Torrey Bot. Club 66(1): 47-52. 1939.—No differences of generic importance are found between Cyclodium Presl and Dryopteris subgenus Stigmatopteris. A key to the spp. of Stigmatopteris with anastomosing venation and peltate indusia is provided. 3 new spp. are descr. from Colombia and Panama, one of which (D. clypeata Maxon & Morton) is of uncertain relationship.—C. V. Morton.

4759. MULAY, B. N. Development of the female prothallium in Azolla pinnata, R. Brown. Jour. Univ. Bombay 6(5): 118-125. 2 pl., 8 fig. 1938.—The megaspores are borne singly in the megasporangia. When the indusium decays the megasporangia are set free with the upper portion of the indusium persisting as a cap. This sporangium freed from the plant immediately sinks to the bottom. The megaspores can germinate any time from the middle of Dec. to the middle of April. The species multiplies a good deal by vegetative reproduction and produces sexual organs throughout the above mentioned period. The first stages of germination of the megaspore take place within the completely closed spore. When the float corpuscles are formed and stand out from the megaspore, it is germinating. The formation of the float corpuscles takes about 20 days, and after this the prothallium begins. In all about 25 to 35 days are required from liberation of megasporangium to complete archegonium formation.-W. D. Pierce.

SPERMATOPHYTA

FRANCIS W. PENNELL, Editor

(See also in this issue Entries 3420, 3450, 3459, 3506, 3507, 3517, 4805, 4809, 4810, 4814, 4843)

GENERAL

4760. Van DERSAL, WILLIAM R. Native woody plants of the United States. Their erosion-control and wildlife values. U. S. Dept. Agric. Misc. Publ. 303. 1-362. 2 col. folded maps in pocket, 44 pl. U. S. Department of Agriculture: Washington, 1938. Pr. \$1.75.—First is considered the relation of vegetation to soil conservation, and problems of woody species to avoid or to plant. A map, developed and explained by FURMAN LLOYD MUL-FORD, presents a classification of 32 plant growth regions over the U.S. These are individually discussed, and their

relations to areas of soil or areas dependant upon climate are shown on larger maps. Most of the book consists of an alphabetical list of woody plants, giving for each technical and common names, range in terms of plant growth regions, preferred site, and brief discussion. Forage value is considered, and many stomach records from the U.S. Biol. Survey give information as to food value of the fruits to mammals, birds, etc. Many species are illustrated by photographs. There is a bibliography of 649 titles, and a 40-p. index to common names of woody plants.—F. W. Pennell.

GYMNOSPERMAE

4761. DUBOIS, G. Pollen et phylogénie chez les Abiétinées. Trav. Lab. Forest. Toulouse 1 (Articles Divers, 2), art. 19. 1-21. Illus. 1938.

2), art. 19. 1-21. Illus. 1938.
4762. FLOUS, F. Significations des rameaux et bourgeons de cèdre. Trav. Lab. Forest. Toulouse 1(Articles Divers 2)

art. 18. 1-26. Illus. 1938.

ANGIOSPERMAE (MIXED)

4763. HOOVER, R. F. New Californian plants. Leaflets of Western Botany 2(8): 128-133. 1938.—New spp. or vars. in Chlorogalum, Brodiaea, Atriplex, Lupinus and Senecio.—L. Constance.

MONOCOTYLEDONES

4766. HÄRDTL, HEINRICH. Die Pollen- und Samenerzeugung unserer Rohrkolben [Typha]. Beih. Bot. Centralbl. Abt. A 58(3): 291-307. 3 fg. 1938.—The development in the spring of both spp. of cattail—Typha latifolia and T. angustifolia—is described. Measurements of the inflorescences are given. Form and size of pollen correspond to known data. Pollen production is considerable. The liberation of seeds from the fruit clusters in fall and winter is described. The fertile pistillate flowers make up the main part of the inflorescence yet the percentage in the 2 cattails is different. The development of fertile seeds is variable; there are plump and thin ones, and the percentage of plump seeds varies over wide limits. The dimensions of the individual fruits are likewise quite different. The sterile seeds (carpodia) are always lighter than the fertile seeds. The number of fruits in a single fruiting spike is large and is always greater in T. l. although from the length of the fruit spikes the opposite would be expected. On the basis of the above results comparisons may be drawn concerning prolificacy and the number of pollen grains in relation to seed production may be calculated. The economic application of cattail-down, aside from technical adaptability, appears to be determined by the lightness of the fluff as well as by its resilience.—Auth. summ. (tr. by H. F. Bergman).

4767. KELLER, G. Monographie und Iconographie der Orchideen Europas und des Mittelmeergebietes. IV. Orchis. Repert. Spec. Nov. Fedde Sonderbeih. A 4(23/24): pl. 369-

384. 1938.

4768. MAHABALE, T. S., and G. S. DESHPANDE. Bulbils of Remusatia vivipara Schott. Jour. Univ. Bombay 6 (5): 47-56. 1 pl., 5 fig. 1938.—R. v. is an aroid found in clefts of trees in the Ghat jungles. It is an annual, which thrives in the monsoon only. It does not produce flowers but a large number of bulbils instead. These are borne in clusters on 3 to 5 phototropic shoots springing from the periphery of the corm, and may number from 700 to 1000 in a season. The course of development of a bulbil is followed through transitional forms, gradually elaborating upon an undifferentiated nepionic stem, leading to its adult

4769. MOLDENKE, HAROLD N. Additional notes on the Eriocaulaceae. I. Phytologia 1: 309-336. 1939.—Notes, with complete synonymy and citation of herbarium specimens, on all known North and Central American spp. and vars. of Eriocaulon, Lachnocaulon, and Paepalanthus and some

stage, the corm.-W. D. Pierce.

spp. of Syngonanthus, including one new species of Syngonanthus from British Honduras.—H. N. Moldenke.

4770. O'NEILL, HUGH T. Cyperus eragrostis and C. vitens in California. Leaflets of Western Botany 2(7): 108. 1938.

4771. RILEY, HERBERT PARKES. A character analysis of colonies of Iris fulva, Iris hexagona var. giganticaerulea and natural hybrids. Amer. Jour. Bot. 25(10): 727-738. 1 fig. 1938.—In 23 clones of a colony of I. h. var. giganticaerulea examined, tube color, color of the blade of the sepal, sepal length, petal shape, length of stamens, shape of the style appendages, and form of the crest were typical of the var. 23 clones of I. fulva located near the others were typical of I. fulva for all those characters. 21 clones located geographically between these 2 species were like giganticaerulea and 2 showed characters of both spp.; of 23 located somewhat nearer I. fulva, 10 were like giganticaerulea and the others showed characters of both species. These 2 spp. are separated in nature by an ecological barrier; fulva occurs chiefly on banks of alluvial ridges and the other

species in cypress swamps. About 10 years before this study, the land between the 2 spp. was cleared and the water level was altered. I. h. var. g. then invaded to the edge of the alluvial ridge, became established there and hybridized with fulva, producing 15 hybrids in the 46 plants investigated. Many of Small's "species" from southeastern Louisiana show the same intermediate relationships to the 2 species as do these hybrids and they were found in similar intermediate habitats. Their hybrid origin is suggested.—H. P. Riley.

4772. RIMBACH, A. Phaedranassa chloracea. Ber. Deutsch. Bot. Ges. 56: 440-446. 1938.—A description of P. c. (Amaryllidaceae) collected in the highlands of Ecuador. Seed germination, root development, bulb formation, and general anatomy is presented. Flowering takes place 3½ years after seed is planted. The anatomy of the flower is discussed.—H. C. Respective.

discussed.—H. C. Beeskow.
4773. STACEY, J. W. Notes on Carex. XIII. Leaflets of
Western Botany 2(6): 90-91. 1938.—New records of spp. of

Carex from Idaho, etc.—L. Constance.

4774. STRELKOVA, O. Polyploidy and geographosystematic groups in the genus Alopecurus L. Cytologia 8(3/4): 468-480.7 fig. 1938.—The low chromosome members of the genus, originally a plains form, still have their widest distribution in the plains. Highly polyploid forms of more recent origin belong to the arctic or high mountainous regions. The correlation between extreme geographical conditions and polyploidy represents perhaps one of the factors active in the origin of new species.—H. Hibbard.

4775. ULKE, TITUS. A new white form of Orchis spectabilis L. Castanea Jour. So. Appalachian Bot. Club 3(5):

70-71, 1938.

DICOTYLEDONES

4776. ANDERSON, EDGAR, and LESLIE HUBRICHT. The American sugar maples. I. Phylogenetic relationships, as deduced from a study of leaf variation. Bot. Gaz. 100 (2): 312-323. 5 fig. 1938.—Acer saccharum (in the broad sense) was chosen for a study of variability because of its known taxonomic complexities and because the variability of the leaf is easy to treat statistically. A study of variability in natural populations shows: The New England groves varied around a single plexus (A. saccharum in the narrow sense); the groves from southwestern Michigan varied around 2 practically discontinuous plexi, A. saccharum and A. saccharum var. nigrum; some of the groves from Missouri and southern Illinois were sometimes like those from Michigan, others showed even greater variability but no division into recognizable plexi. By reconstructing an average leaf for each population plexus it is shown that A. saccharum var. nigrum has no effect upon A. saccharum. On the hypothesis that A. saccharum var. nigrum equals A. saccharum modified by an unknown Acer, the unknown is detd. by statistical prediction and proves to be identical with A. saccharum var. rugelii, an American maple of controversial taxonomic status.—Authors.

4777. BABCOCK, E. B., and G. L. STEBBINS, Jr. The American species of Crepis. Their interrelationships and distribution as affected by polyploidy and apomixis. Carnegie Inst. Washington Publ. 504. 1-199. Illus, 1938.—12 spp. of Crepis indigenous to N. America and 9 introduced from the Old World are recognized. Of the former, 2, C. nana and C. elegans, are arctic-alpine, and not closely related to the others. C. runcinata consists of 7 geographic segregates or subspecies, all of them with the same chromosome number (2n=22). It occurs chiefly in the western U.S., the center of its distribution being the central Rocky Mountains. There is no evident connection between it and any of the other spp. recognized. The 9 other spp. include 7 diploid forms which have the somatic chromosome number 2n=22. These, when taken by themselves, are entirely distinct from one another, but they are connected by a continuous. complex series of polyploid intergrading forms, partly or wholly apomictic, with somatic numbers ranging from 33 to 88. The polyploids are of 2 sorts: a few are morphological autopolyploids, identical with the diploids except for possessing gigas characteristics; the great majority are allopolyploids, which combine the characteristics of 2 or more diploids. Except for C. runcinata, each diploid form is confined to a single climatic province or part of one;

6 occur in northeastern California and adjacent Oregon; 2, in central Washington. The autopolyploids usually do not occur outside the province occupied by the corresponding diploid. The allopolyploids show by their distribution the combination through hybridization of the physiological characteristics that determine their distribution. The different forms have different soil preferences, so that their distribution is partly governed by the occurrence of different geological formations, as shown by intensive studies of small areas in northeastern California. These species with small areas in hortifastern Camornia. These species with x=11 as their basic number probably were originally derived by allopolyploidy from hybrids between 4- and 7-paired spp. of the Old World, but were probably not all derived from the same hybrid. The subsequent evolution of the group has been determined by the processes of hybridization, polyploidy, and apomixis, coupled with the selective activity of the environment. To cover this and similar groups of interrelated spp. containing polyploids. sensitive groups of interrelated spp. containing polyploids, the concept of the heteroploid (chiefly polyploid) complex is defined and developed. Genetically these can be divided into sexual and agamic complexes. Compared with homoploid groups, they show great variability and taxonomic complexity, particularly in the regions occupied by 2 or more diploids. The application to agamic complexes of the usual criteria on which the species concept is based indicates that there are in these complexes no entities that are homologous to species as they exist in homoploid, sexual groups. Considering this, the writers propose a systematic treatment of this type of complex in which spp. and subspp. are recognized chiefly on the basis of the distinctions between the diploid, sexual forms. A large number of formae apomicticae which have no taxonomic status are described to cover the individual biotypes perpetuated by apomictic reproduction. Crepis runcinata subspp. imbricata apomicus reproduction. Crepts runcinata subspp. imbricata and hallii, C. occidentalis subsp. conjuncta, C. bakeri subsp. idahoensis, C. exilis subsp. originalis, and C. acuminata subsp. plurifiora are new subspecies. C. runcinata subsp. glauca (C. glauca (Nutt.) T. & G.), C. runcinata subsp. andersonii (C. a. Gray), C. r. subsp. barberi (C. b. Greenm.), C. occidentalis subsp. pumila (C. p. Rydb.), C. bakeri subsp. cusickii (C. cusickii Eastw.), C. modocensis subsp. subacanlis (C. subaccaulis (Kellogy) Coville) C. m. subsp. caulis (C. subacaulis (Kellogg) Coville), C. m. subsp. rostrata (C. τ . Cov.), and C. m. subsp. glareosa (C. g. Piper) are published.—G. L. Stebbins, Jr.

4778. CAMP, W. H. Studies in the Ericales. IV. Notes on Chimaphila, Gaultheria and Pernettya in Mexico and adjacent regions. Bull. Torrey Bot. Club 66(1): 7-28. 1939.—New spp. and vars. are descr. in Gaultheria and Pernettya, from Mexico and El Salvador.

4779. CONSTANCE, LINCOLN. The genus Eucrypta Nutt. Lloydia [Cincinnati] 1(1/4): 143-152. Map, 1 pl. 1938(1939).—One n. comb., for a var. originally in Phacelia.

4780. DIELS, L. Beiträge zur Flora von Mikronesien und Polynesien V. Bot. Jahrb. 69(3): 395-400. 1938.—Includes discussion of the Myristicaceae and Moraceae of Micronesia, with keys to the species of Horsfieldia, Myristica, and Ficus.-H. N. Moldenke.

4781. EASTWOOD, A. The perennial lupines of California. I. Leaflets of Western Botany 2(6): 81-86. 1938.—One new species of Lupinus.—L. Constance.

4782. EASTWOOD, A. The tobacco collected by Archibald Menzies on the northwest coast of America. Leaflets of Western Botany 2(6): 92-94. 1938.—Is Nicotiana multivalvis Lindl.—L. Constance.

4783. GUILLAUMIN, A. Materiaux pour la flore de la Nouvelle-Caledonie. LII. Révision des Rutacees. Bull. Soc. Bot. France 85(5/6): 293-305. 1938.—Keys are given for the 20 genera and 63 spp. found in New Caledonia, including 3 new spp. of Fagara [Zanthoxylum s.), 1 of Evodia, 2 of Zieridium, 1 of Dutaillyea, 1 of Melicope, 2 of Pelea, and 1 of Citrus.—E. L. Core.

4784. KECK, DAVID D. Revision of Horkelia and Ivesia. Lloydia [Cincinnati] 1(1/4): 75-142. 9 fig. 1938(1939).— One n. subsp. of Horkelia is descr., and many new names and n. combs. are published in Horkelia and Ivesia, involving changes of status within these genera, or transfer from one to the other or from Potentilla.

4785. LUNDELL, C. L. Six new trees and shrubs from tropical North America. Phytologia 1: 305-309. 1939.—Three spp. of Maytenus (Texas, British Honduras), two of Eugenia

(British Honduras), and one of Osmanthus (Mexico) are proposed as new.—H. N. Moldenke.

4786. MUNZ, P. A. Interesting western plants. III. Leaflets of Western Botany 2(7): 113-115. 1938.—New records for southern California, and description of a new

var. of Mimulus.—L. Constance.
4787. RIMBACH, R. Muchlenbeckia tamnifolia. Ber.
Deutsch. Bot. Ges. 56: 436-439. 1938.—M. tamnifolia was
collected in the highlands of Ecuador. Its geographical distribution, growth characteristics, anatomy, and flowers are descr.—H. C. Beeskow.

4788. SCHWARZ, O. Die Gattung Globularia. Bot. Jahrb. 69(3): 318-373. 8 pl. 1938.—A monographic study in which I new subgenus, 4 new sections, 2 new subsections, and 2 new species (European) are proposed, together with 4 new combinations and names for subgenera, sections, and

spp. Keys are supplied.—H. N. Moldenke.
4789. SHARSMITH, CARL W. On the identity of Claytonia nevadensis Watson. Madroño 4(6): 171-176. 1 pl.

4790. SLEUMER, H. Die Gattung Agauria (DC.) Hook. f. Bot. Jahrb. 69(3): 374-394. 1 fig. 1938.—A monographic study in which 5 new vars., 1 new subvar., and 10 new forms are proposed, together with 2 new combinations for a variety and subvariety, all African. Keys are supplied.-H. N. Moldenke.

4791. STEENIS, C. G. G. J. van. Het gelam bosch bij Angké-Kapoek (Batavia). [The gelam forest at Angké, near Batavia.] [With Eng. summ.] Tectona 31(12): 889-900. 4 pl., 2 fig. 1938.—A recently discovered pure grove of Melaleuca leucadendron covering about 5 ha. in the Angké forest is the 1st reported occurrence of a representative of the genus in Java. The grove is in a brackish swamp forest. The sp. is polymorphic and probably should be split into several spp., subspp., and vars. Some vars. yield commercially valuable oil.—W. N. Sparhawk.
4792. TEMPLETON, BONNIE C. The fauna and flora

of the El Segundo sand dunes. 2. A new species of Pholisma. Bull. Southern California Acad. Sci. 37(3): 98-100. 2 fig. 1938.—P. paniculatum, California, parasitic on the roots of Eriogonum parvifolium and Croton californicus on sand dunes. It is separated by key from the other 2 spp. of the

genus.-W. D. Pierce.

FLORISTICS AND PLANT DISTRIBUTION

4793. ARWIDSSON, TH. Studier över floran och vegetationen på Gotska Sandön med sarskild hänsyn till nationalparken. K. Svenska Vetenskapsakad. Avhandl. i Naturskyddsärenden 1. 1-71p. 6 pl., 3 fig. 1938.—A critical enumeration of all known cryptogams and phanerogams from the interesting Swedish island, Gotska Sandön, in the Baltic Sea. The list of phanerogams is especially complete; of the cryptogams only the Filices and Lichens are com-plete; of the other cryptogams, only a few species are known from the island. The "Gotska Sandön" national park—about 1/10 of the whole island—has been more intensively studied than other parts of the island. Former investigations and some studies on the vegetation of the island are discussed.—T. Arwidsson.
4794. CRETZOIU, PAUL. A doua contribuțiune la cuno-

asterea florei pădurilor din regiunea Vaii Cernei. [Forest flora of the Cerna Valley, Rumania.] Rev. Pădurilor [Bucharest] 50(11): 967-977. 1938.—A list of spp., with notes on

the locality where each is found.

4795. HERSHEY, A. L. Notes on plants of New Mexico.

I. Leaflets of Western Botany 2(8): 138. 1938. 4796. HOSIE, R. C. Botanical investigations in Batchawana Bay Region, Lake Superior. With: A catalogue of the vascular plants, by T. M. C. TAYLOR, and, A study of the mammal population of the vicinity of Pancake Bay, Algoma District, Ontario, by C. H. D. CLARKE. Bull. Nat. Mus. Canada 88. v+1-152p. 34 fig. 1938.—This report, based upon one season's field work by a party of 7, comprises a discussion of local too graphs. discussion of local topography, geology and climatology, together with a fairly detailed account of the ecology of the area. The catalogue of vascular species includes about 700 names; 41 mammals are also reported and discussed. The composition of the vegetation indicates that the area inrestigated lies near to the northern boundary of the Transition Forest region.—T. M. C. Taylor.

4797. HOWELL, J. T. A botanical visit to the Vancouver

pinnacles. II. Leaflets of Western Botany 2(8): 135-137. 1938.—Field notes, and description of a new var. in Navar-

retia.—L. Constance.

4797A. HOWELL, J. T. A collection of Douglas' west American plants. III. IV. V. Leaflets of Western Botany 2(6): 94-96; (7): 116-119; (8): 139-144. 1938.—Further notes on duplicate specimens collected by David Douglas, and now in the Russian Academy of Sciences, Leningrad .-L. Constance.

4797B. HOWELL, J. T. A botanical visit to the Van-couver pinnacles. Leaflets of Western Botany 2(6): 97-102. 1938.—Field notes, with description of new plants or nomenclatural changes in Linanthus, Allium and Campa-

nula.-L. Constance.

4798. JONES, G. N. Supplementary notes on the flora of the Olympic peninsula. Leaflets of Western Botany 2 (7): 105-108. 1938.

4799. MÖBIUS, M. Entstehung und Entwicklung der Floristik. Bot. Jahrb. 69(3): 295-317. 1938.—A brief history of early works on floristics and the authors of regional floras. -H. N. Moldenke.

4800. ROUSSEAU, JACQUES. Notes floristiques sur

l'est de la Nouvelle-Écosse (Nova Scotia). Nat. Canadien 65(11): 285-315; (12): 317-335. 8 fig. 1938.—Ecologic and phytogeographic notes with an annotated list including new entities in Pinus, Agrostis, Viola and Hypericum.-A. L. Pickens.

4801. SHOWALTER, HIRAM M. The distribution of Tradescantia in the eastern Tennessee region. Jour. Tennessee Acad. Sci. 13(4): 253-258. 1 fig. 1938.—Tradescantia subaspera var. montana, a very ancient species, is most widely distributed in the more mountainous regions, particularly in the Great Smoky Mountains. The evidence seems to indicate that gradual change in soil conditions, and recent disturbing influences of man, have brought on a steady decline in the incidence of this species. T. canaliculata is rapidly migrating into the region from the south, and in many locations the 2 coincide and hybridize to further destroy the identity of T. subaspera

var. montana.—H. M. Showalter.
4802. TEMPLETON, BONNIE C. The fauna and flora of the El Segundo sand dunes. 3. A new botanical record for California. Bull. Acad. Sci. 37(3): 100. 1938.—Plantago indica found in stabilized sand dune area.—B. C. Templeton.

MORPHOLOGY AND ANATOMY OF VASCULAR PLANTS

(See also in this issue Entries 3451, 4759, 4766, 4768, 4908)

4803. CAREY, GLADYS. Comparative anatomy of leaves from species in two habitats around Sydney. Proc. Linn. Soc. N.S. Wales 63(5/6): 439-450. 6 fig. 1938.—A description is given of the anatomical variations shown in leaves from plants growing in sclerophyll- and rain-forests, with par-ticular reference to stomata and vascular tissue. The figures given indicate a significant difference between the mean stomatal indices of rain-forest types in England and New South Wales, but when different habitats are considered, no correlation between stomatal index and environment. The only indication of constancy in stomatal index is found among spp. of the same genus. The conclusions reached with regard to vascular tissue are in accord with those of other workers in the Northern Hemisphere, that sclerophylls exhibit more closely reticulate venation than

rain-forest types.—G. Carey.

4804. COOPER, R. E. Phyllody in the flowers of Crotalaria striata, DC. N. O. Leguminosae. Jour. Univ. Bombay 6(5): 57-61. 1 pl., 1 fig. 1938.—Description of the tendency in this species for the stamens to become leafy, the petals to turn into sepals, stamens into carpels, and carpels to become leaflike, under abnormal physiological conditions, such as insect bite, or presence of a virus.—W. D. Pierce.
4805. COPELAND, HERBERT F. The Styrax of north-

ern California and the relationships of the Styracaceae. Amer. Jour. Bot. 25(10): 771-780. 49 fig. 1938.—In S. officinalis var. californica, development of stamens and pollen is quite normal; the ribbing of the endothecium in the pollen sacs is poorly developed; n=8. Each placenta bears about 8 apotropous bitegmous tenuinucellate ovules equipped with obturators. The 2 archesporial cell is itself the megaspore mother cell. Development of the embryo sac is of normal type. In any one ovary, only one ovule becomes a seed. The endosperm is probably cellular from the beginning. Development of the zygote is delayed for about a month. These characters and others substantiate the position of Styracaceae in the order Ebenales; and indicate that the living plants which most nearly represent the ancestry of the Ebenales are the Theaceae.—H. F. Copeland.

4806. DAVID, ELIZABETH. Embryologische Untersuchringen an Myoporaceen, Salvadoraceen, Sapindaceen und Hippocrateaceen. Planta 28(4): 680-703. 24 fig. 1938.— Representatives of the Myoporaceae (Myoporum humile and Oftia africana), Salvadoraceae (Azima sarmentosa), Sapindaceae (Cardiospermum hirsutum, C. halicacabum, and Sapindus trifoliatus), and Hippocrateaceae (Salacia oblinga and Hippocratea indica) were studied. Detailed information concerning the archesporial tissue, reduction division, development of the embryo sac, and the development of pollen in these species is given. Secretory tissue

in the Myoporaceae is described. The value of such information in determining the taxonomic position of the families is stressed.—G. L. Cross.

4807. DEHAY, CH. Perforation de racines vivantes par

le rhizome de Chiendent. Bull. Soc. Bot. France 85(5/6): 403-406.1 pl., 1 fig. 1938.—An account of histological changes in the roots of Althaea officinalis induced by the pressure of perforating rhizomes of Agropyron repens.—P. D. Strausbaugh.

4808. DIETTERT, R. A. The morphology of Artemisia tridentata Nutt. Lloydia 1(1/4): 3-74. 20 pl. 1938(1939).-This investigation embodies detailed morphological studies of the vegetative and reproductive organs of the common sagebrush (A. tridentata). The flowers, although initiated early in the season, show very little development during the extremely hot and dry weather, but develop rapidly during late summer and early autumn. A diploid number of 18 chromosomes was established; meiosis occurs in the develops without definite generative or c'cells, and the sperms are naked nuclei. The \(\frac{9}{2} \) gametophyte has an elaborate antipodal haustorium which persists until late in the development of the embryo. Fertilization and triple furior were absorated and early development of the embryo. fusion were observed, and early development of the embryo is described. The foliage is evergreen and winter buds are lacking. The leaf is of the unilateral type, composed of epidermis, an adaxial and abaxial palisade and a thin median spongy mesophyll. The stem tip consists of a three layered tunica and a central corpus; the leaf primordia initiate by periclinal divisions in the 2d and 3d layers of the tuning. Data are presented in further expect of the the tunica. Data are presented in further support of the view that the intercellular spaces in the mesophyll arise from an unequal expansion of the external and internal layers of the leaf. The dense coating of both glandular and cover trichomes is a conspicuous macroscopic feature of this plant and may aid in transpiration control. The stem presents several unique features; annual rings of interxylary cork develop which undoubtedly aid the plant in conserving its water supply by completely isolating the younger, functional parts of the wood from the older, lifeless interior mass; the wood is of the diffuse porous type with the vessels of the spring wood much more numerous but on the average smaller than those of the summer wood; the fibers of the latter, however, are more numerous and thicker walled than those of the former. The stems exhibit a very marked eccentricity of growth due to the death of fruiting branches and to the local insufficiency of the protective layers.—R. A. Diettert.

4809. EARLE, T. T. Embryology of certain Ranales. Bot. Gaz. 100(2): 257-275/18 fig. 1938.—Based on previous investigations of the embryology in 5 families of the

Ranales, the group as a whole presents 2 distinct types of embryo development. In the Magnoliaceae, Ranunculaceae, and Berberidaceae, the embryo is at first an undifferentiated, pear-shaped body with a massive suspensor. The cotyledons arise symmetrically from the distal end of the embryo as 2 independent structures. In the present investigation the embryology of Magnolia grandiflora and Cimicijuga racemosa is seen to conform to this plan. In the Nymphaeaceae and Ceratophyllaceae, a suspensor is usually lacking, the cotyledons arise from a common primordium, and the mature embryo is asymmetrical. Furthermore, in the Magnoliaceae, Ranunculaceae, and Berberidaceae, the endosperm consists in its early development of free nuclei, while in the Nymphaeaceae and Ceratophyllaceae the endosperm in nearly all cases is cellular from the beginning. There seems to be some basis for the suggestion that the Nymphaeaceae and Ceratophyllaceae in the Managartyladanaea.

laceae be placed in the Monocotyledoneae.—T. T. Earle.

4810. JUHNKE, GERDA, und HUBERT WINKLER.

Der Balg als Grundelement des Angiospermengynaeceums.

Beitr. Biol. Pflanzen 25(3): 290-324. 15 fig. 1938.—A large number of angiosperms were used in a phylogenetic study of the gynoecium. The investigator considers that the angiosperms have a monophyletic origin and that the

follicle is the primitive gynoecial structure.—O. J. Eigsti.
4811. KERPEL, D. A. Microscopical anatomy of tropical plants. II. Observations on the development of the kapok hair. Ann. Jard. Bot. Buitenzorg 48(3/4): 173-186. 4 pl., 7 fig. 1938.—The multiseriate position of the ovules in the loculi of the gynaeceum of Ceiba pentandra appears to originate from a biseriate position in consequence of mutual pressure of the growing ovules. The commercial kapok hairs originate from the epidermis of the inner side of the pericarp only. They often appear as "double hairs" or "groups of hairs" originating from 2 or more adjacent cells. Due to lack of space for elongation the hairs curve, the curvatures becoming fixed by the deposition of secondary wall layers. The hairs are very sensitive to changes in humidity, which cause torsions in the already undulated hairs. Consequently the kapok in the dehisced fruit shows no traces of the original insertion of the ovules and hairs. The wall of the hairs is perforated by submicroscopic pores permeable by water and certain solns, but not permeable by various other liquids. The air contained in the hair lumen is dissolved by the entering liquids.—D. A. Kerpel. 4812. ROSÉN, WILLIAM. Beiträge zur Kenntnis der

Embryologie der Goodeniaceen. Medel. Göteborgs Bot. Trädgård 12: 1-10. 25 fig. 1937(1938).
4813. SIMONDS, AUSTIN 0. The anatomical develop-

ment of Lepidium draba. Jour. Agric. Res. 57(12): 917-928. 4 pl., 5 fig. 1938.—The stele of the root is exarch diarch. Root-stem transition is a short distance below the cotyledons. Primary plumule development is independent of the primary vascular system of the root and plumule elements are continuous with secondary tissues of the hypocotyl. Some young primary and secondary roots possess a secondary wall thickening deposited in the first layer of cortical cells next to the endodermis and the primary cortex is sloughed very early. Old roots and seedling hypocotyls produce adventitious shoots readily. Less commonly stem shoots form root meristems, and stem hairs may become modified as root hairs below the surface of the ground. The pubescent leaf had 173,355 stomata per sq. inch and a very compact mesophyll suggestive of xeric plants. The upper portion of the roots contained large intercellular spaces somewhat like those of hydric plants.— A. O. Simonds.

4814. TILLSON, ALBERT H., and RONALD BAMFORD. The floral anatomy of the Aurantioideae. Amer. Jour. Bot. 25(10): 780-793. 49 fig. 1938.—A study of the floral anatomy of 94 spp. comprising 29 genera of the Aurantioideae was made from a taxonomic and phylogenetic viewpoint, using both fresh material and softened herbarium specimens. The tribe Clauseneae is set off clearly from the tribe Citreae by the fact that in the former group the sepal and petal midribs arise independently from the axis, while in the Citreae the sepal midribs are fused with the lateral petal bundles, and in some spp. the lateral sepal bundles are fused to the petal midribs. Unusually large oil glands are present in many floral organs and are usually in close association with vascular tissue. The possibility that pleiomery of the stamens arises from the division of antesepalous stamens or both antesepalous and antepetalous stamens is indicated by branching of their traces. The disc appears to represent a 3d whorl of vestigial stamens. The uninterrupted alternation of all the whorls is obtained, and the antepetalous position of the carpels of isomerous ovaries is explained, by this interpretation of the nature of the disc. The stylar canals consist of narrow slits surrounded by epidermal cells and are continuous from the papillose stigmatic cells to the conducting hairs between the placentae. They are not modified ventral carpel bundles.—A. H. Tillson.

AGRONOMY

Editor: CARLETON R. BALL. Associate Editors: M. A. McCALL, Crops; R. B. DEEMER, Soils (See also in this issue Entries 3457, 3507, 3508, 4123, 4403, 4782, 4875, 4890, 4910, 4911, 4913, 4914, 4915, 4935, 4991, 4993, 5001, 5006, 5034)

CROP SCIENCE (ARVICULTURE)

4815. ARAGON, VICENTE B., and ESTEBAN CADA. A preliminary report on the performance of ten rice varieties from the Federated Malay States. Philippine Agric. ties from the Federated Malay States. Philippine Agric. 27(8): 635-646. 4 fig. 1939.—During the last 20 years some 73 vars. of rice had been imported by the College of Agric. from different countries. Tests on the performance in agronomic characters of those vars. from the Federated Malay States indicated that there are at least 4 vars.—Seraup Kechil 146, Seraup Kechil 36, Seraup Besar (Sakapol) 15, and Radin No. 2—which are promising and should be subjected to further selection in an effort to establish pure lines.—M. Manresa.

4816. ARENS, K. Quéda de orvalho e equilibrio da âgua no algodociro. [Dewfall and the water balance of cotton.] [With Ger. summ.] Bol. Techn. Inst. Agron. Camp. São Paulo 41. 1-8. 1938.

Paulo 41. 1-8. 1938.

4817. BENINCASA, M. II. Burley di gran reddito. [A large yielding tobacco.]. Boll. Tecn. R. Ist. Sper. Tabacchi Scafati 35(3): 127-130. 1 pl. 1938.

4818. BOGUSLAWSKI, E. von. Die Sortenleistung in

Abhängigkeit von der Düngung und den Stickstoff/Kaliverhältnis in der Düngung, Untersuchung bei Winter- und Sommerweizen. Landw. Jahrb. 86(2): 207-244. 1938.— Variety differences in wheat were investigated in pot tests

with reference to yield, length of vegetative period, transpiration and water utilization. Differences were shown in the relative increases in yield and particularly in the relative grain production or grain/straw ratio by increasing K fertilization and by variation in the quantities of N applied. The grain/straw ratio passes through a minimum with increasing improvement in growth conditions of fertilization and water supply. Vars. with the higher grain/ straw ratios showed a particularly high assimilating power. The differences in nutrient uptake may be slight in spite of considerable differences in producing capacities. The vegetative parts of one variety could be enriched in nutrients (particularly K) without having the physiological influence as in another variety. In general, the most definite variety differences are brought into evidence by the higher

fertilizer applications.—I. C. Feustel.
4819. CANNING, J. Oats and the lucerne stand. Ancient and modern methods in the cultivation of lucerne. Fertilizer (London) 23(20, 21): 513, 515, 546-547. 1938.

4820. CARBONE, D., M. ARATA, et H. ROTHSCHILD. Études sur une substance fertilisante (Note préventive). Soc. Internaz. Microbiol. Boll. Sez. Ital. 10(7/8): 160-163.

4821. CARTER, DEANE G., and KYLE ENGLER. Problems of water resources for rice irrigation. Arkansas Agric.

Exp. Sta. Bull. 371. 1-31. 2 pl., 13 fig. 1939.—An investigation of water resources for rice irrigation was conducted in the Grand Prairie region, Arkansas, covering 8 years, 1929 to 1937. Results are presented covering water requirements for rice irrigation, ground water conditions, and surface water supplies. About 90% of the water for irrigation is drawn from the Pleistocene sands. The withdrawal of approx. 175,000 acre feet annually has resulted in a gradual decline of the depth of water in wells, ranging from less than 0.5 foot at the border to more than 1.25 ft. per year near the center of the area. Maps show the piezometric surface and average annual decline for the area. The average water requirement for rice varied from 26.8 inches to 33 inches during the period of study. An increasing use is made of surface supplies for irrigation. Evaporation from

a reservoir surface amounted to 0.12 inches per day, which is slightly less than the average daily rainfall.—D. G. Carter. 4822. CHEN, EN-FENG. Untersuchungen über die Zersetzung des Stallmistes im Boden während der Vegetation. Landw. Jahrb. 86(1): 71-121. 1938.—Pot vegetative tests with oats were conducted with sand, soil, sand-soil and peat-soil mixtures to which a basic fertilization and varying quantities of sheep, horse or cow manure were added. Hygroscopicity detns. indicated that manure when first applied combines in some way with the soil particles. A calorimetric method used for detn. of the degree of decompn. of manure indicated that the most intensive decompn. occurred in the case of porous or limed soils. Hygroscopicity measurements proved to be an aid in observing the progress of decompn. The effect of manure in water percolation was greatest in loam soil but not noticeable in sand or moor soil. Water holding capacity was increased by the addition of manure, the increase being greatest in sand and least in moor soil. Liming also caused an increase in the loam and moor soils. Increases in oats yields resulting from manure additions (with complete supplementary fertilization) were related to increases in the content of available water. The activity factor 0.012 per g. of dry manure was in fair agreement with the observed data. Values for pH increased with increasing quantities of manure, particularly in soils with good aeration.—I. C. Feustel.

4823. DAWSON, RAY F. Nitrogen nutrition and nicotine synthesis in tobacco. Bot. Gaz. 100(2): 336-346. 1 fig. 1938.

—Tobacco plants were grown with various forms of nutritive N under light conditions limiting for photosynthesis. Ammonium N, compared with nitrate, increased the relative leaf nicotine content of young plants, but exerted no effect in subsequent stages of growth. Nitrate nutrition caused a slight but uniform decrease in nicotine percentage during the period of most active growth. Plants grown in soil contained a much higher conc. of nicotine in the leaves than did those in sand.—R. Dawson.

4824. DICKEN, S. N. Cotton regions of Mexico. Econ. Geogr. 14(4): 363-371. Illus. 1938.
4825. FLORES, FLORO B. Viability of seeds of cotton as affected by moisture and age under different methods of storing. Philippine Jour. Agric. 9(4): 347-356. 1938.—The cotton-seed used in this exp. was from the var. "Kapas Purao." Sun-dried seeds stored in air-tight containers, whether delinted, ginned, or seed-cotton, were sufficiently viable for planting purposes after 1 year in storage; the same

kind of seeds kept in burlap sacks were useless after 6 months in storage.—M. Manresa.

4826. FRAPS, G. S., and A. J. STERGES. Effect of phosphates on nitrifying capacity of soils. Soil Sci. 47(2): 115-121. 1939.—Phosphates in the presence of CaCO₃ increased nitrification of (NH₄)₂SO₄ in several soils of low nitrifying capacity. The average order of effectiveness of phosphates to promote nitrification, beginning with the most effective, was: monopotassium phosphate, 20% superphosphate, dipotassium phosphate, monocalcium phosphate, phosphate, disalcium phosphate, disodium phosphate, rock phosphate, and soft phosphate with colloidal clay. The soils which respond to phosphates are low in active phosphoric acid and fair to high in lime and basicity. Authors.

4827. GARNER, H. V., and S. J. WRIGHT. The distribution of fertilizers. Papers and Discuss. Oxford Farm. Conf. 3: 64-74. 1938.

4828. GREENWAY, P. J., T. H. MARSHALL, and W. V.

HARRIS. Kapok. I-III. East African Agric. Jour. 3(6): 440-445. 1938.—I. The botany and agronomy of kapok. II. Kapok in Tanganyika. III. Pests and diseases of kapok.

4829. HANLEY, J. A. Our grassland. Papers and Discuss. Oxford Farm. Conf. 3: 19-25. 1938.

4830. JOHNSON, A. A., and S. T. DEXTER. The response of quack grass to variations in height of cutting and rates of application of nitrogen. Jour. Amer. Soc. Agron. 31(1): 67-76. 3 fig. 1939.—Quack grass (Agropyron repens), cultures in sand with nutrient soln. with and without N were grown in a greenhouse. The cultures were cut weekly over a period of 24 weeks at heights ranging from sand level to 8 inches above the sand level. At the end of 24 weeks the close cut cultures receiving N were dead while the close cut cultures with no applied N were still alive and had a of the original rhizome weight left. Cutting cultures high in N at the one-inch level was very injurious while the same treatment to low N cultures caused only small injury. Quack grass plants low in N stored organic reserves in subterranean parts under more severe cutting than did plants high in N—Authors.

4831. JONES, E. T. New varieties and strains from the Welsh Plant Breeding Station. [1.] S 84. Spring oat for soils of high productive capacity. [2.] 175. Spring oat for soils of medium productive capacity. Univ. Coll. Wales, Leaflet Ser. S 4. 1-23. 3 pl. 1938.

4832. KRÜGER, W., H. ROEMER, G. WIMMER, und H. LÜDECKE. Die Dauerversuch des Bernburger Versuchfeldes. Landw. Jahrb. 86(4): 605-623. 1938.—Field expts. which have been conducted since 1909 with varying rotation and fertilization treatments are described. Constant yields of potatoes were maintained over a 20 yr. period by mineral when N, P or K fertilizers were used alone. Greater decreases in yield were observed (from 152.75 to 107.28 dz./ha.) over the same period without fertilization. Detailed data relative to starch and mineral content of potatoes having varying treatments are recorded for 1910 to 1934.—I. C. Feustel.

4833. LANGE, ARTHUR. Untersuchungen über den Wachstumsfaktor Wasser. Landw. Jahrb. 85(4): 465-500. 1938.—The relationship of crop yields to water requirements was investigated under widely varying conditions with respect to soil type, moisture holding capacity, fertilizer treatment and other factors. The water requirements for different vars. of cereals varied from 312 to 559 kg. per kg. of dry substance. Higher values were obtained with partial fertilization. Barley required less water per unit of dry substance than oats or wheat. The water activity factor is expressed in terms of quantity of water supplied.—I. C. Feustel.

4834. MacDOWALL, R. K. Some factors influencing the agricultural use of chemical weedkillers. Ann. Appl. Biol. 25(3): 648-652. 1938.—The author observes the numerous problems involved in the use of chemicals for weed control. The cost of applying chemicals as cyanamide as a powder is about 1s.6d. per acre as contrasted with about 4s.6d. to apply H₂SO₄ as a spray. With the increase in use of dry chemical applications, more effective weed control has resulted.—H. K. Wilson.

4835. MANOFF, ISAAC. El problema del riego en Cruz Alta. [The problem of irrigation in Cruz Alta.] Rev. Indust. y Agric. Tucuman 27(4/6): 90-94. 1 fig. 1937 (1938).—Irrigation in the district of Cruz Alta is almost entirely from the Sali River. The variability of flow of this river within the year and among the years produces wide fluctuations in the production and quality of sugar cane. The graph published shows that in each 10-year period there are from 1 to 3 years of below normal rainfall; and this brings 2 hazards to the production of sugar cane: (1), a shortage of water for the normal development of the crop, and (2), a concentration of alkali salts that is injurious both to the crop and to the soils. The factory processes are also interfered with. In volume 26 of the *Revista* was published a study of the salt content of the waters of this river and its tributaries. It was found that during the rainy season the salt content of these waters was about 0.5 g. per litre; during dry seasons following dry years it ran as high as 2.3 g. per 1. The major part of this salt is NaCl, and the use of this water in the factory results in the loss

of sugar and the crusting of the reducing pans. The high conc. of salt is even more injurious when the water is used for irrigation because the period of high salt content comes when the need for water on the cane is greatest. The chlorides and sulfates of Na retard and injure root development, and after a number of years the soil becomes unfit for agricultural use. The only remedy for this heavy charge of alkali in the soil is the heavy rainfall of summer. When this fails the salt content of the soil goes up to about 0.5%, and the ash content of the cane is raised from 3 to 5 times higher than in other sugar regions. Remedies proposed against this situation are, (1), to use the waters at periods of low flow for the making of common salt which can be disposed of in adjacent provinces; and (2), build reservoirs for the impounding of the water when the salt content is low, both for irrigation and for restoring the ground-water level. Also the silt content of this fresh water which is abundant and rich in N (0.3%) could be saved to spread over the land.—J. W. Gilmore.

4836. MANOFF, ISAAC. Determinacion del peso especi-

fico de la caña azucar. [Detn. of the specific gravity of sugar cane.] Rev. Indust. y Agric. Tucuman 27(7/9): 175-176. 1937(1938).—To determine the specific gravity of sugar cane, and also of different parts of the stem, detns. were made of these factors, using variety P.O.J. 36 rattoon. The trial was made with fresh-cut cane. 20 canes were used, ranging from 1.55 to 1.65 m. in length, all taken from the same row. Each cane had 2 immature internodes and 14 mature internodes, and was cut into pieces of 2 internodes each. No significant difference was found in the sp. gr. of the 2-internode pieces from different parts of the stem. There was a difference in fiber content, the higher content (13.92%) being in the upper part of the stem and the lower content (11.97%) in the lower part. The upper $\frac{2}{3}$ of the stem, comprising 37.25% of the total weight, had a sp. gr. of 1.094 and a fiber content of 13.88%; the lower } of the stem, comprising 62.75% of the total weight, had a sp. gr. of 1.085 and a fiber content of 12.20%. The sp. gr. of the entire stalk was 1.088 and its fiber content 12.82%.— J. W. Gilmore.

4837. MATHIEU, G. L'irrigation souterraine en Provence—état actuel de la question. Ann. Agron. [Paris] 8(6): 777-787. 1938.—Sub-irrigation is superior to overhead sprinkling; its use has been uniformly successful on market gardens, flowers, fruit orchards, forage crops, and seed-beds. Its beneficial influence lies in physical, chemical and biological betterment of soils, giving better plant nutrition and heavier crops. The "Cavaillon" system is recommended.—
R. R. McKibbin.

METZGER, C. H. Commercial fertilizers in Colorado in 1937. Amer. Potato Jour. 15(9): 252-261. 1938.
—Six commercial fertilizer formulas were used in each of 5 tests located in the 4 main commercial potato producing districts of the State. Consistent and profitable increases in yield have only been obtained on the sandy soils of the San Luis Valley. Ammoniated on the sandy sons of the San Luis Valley. Ammoniated phosphate 10-53-0 and 4-12-4 showed increases of 87 and 53 cwt. to the acre, respectively. The effect of the fertilizers on the grade of the tubers was not as marked as in 1936. P again increased the dry matter content of the tubers; N again markedly reduced both starch and dry matter. K₂O also reduced the starch and dry matter content of the tubers. 100 tubers from each treatment were measured. K₂O produced the best shaped Russet Burbank tubers, followed by phosphate-potash, phosphate complete, check, N and ammoniated phosphate.—C. H. Metzger.

4839. MIDGLEY, A. R. Four pasture clovers. Vermont Agric. Exp. Sta. Bull. 431. 1-16. 8 pl. 1938.—Natural wild white clover outranked common white Dutch, Ladino, and English white wild clovers in respect to persistence and longevity when the 4 clovers, variously fertilized, were compared as to usefulness for pasture purposes. Its growth, when properly fertilized, increased as time passed, while that of the others decreased. Its stand continued to improve, and after 3 seasons a dense turf covered all plats on Woodbridge loam, Addison clay loam, and Berkshire stony loam soil types and even began to supersede the other clovers. The English type both needs and withstands close grazing. Ladino, being a more erect type, disappeared quickly when

grazed closely, but succeeded better when less closely eaten. It outyields the other clovers while it lasts. In growth habits the white Dutch was intermediate between the English and Ladino types. Natural wild white clover succeeds best on moist, rather heavy and not too acid soils with high organic matter and mineral contents. Close grazing and repeated usage of minerals are important in establishing and maintaining a wild white clover pasture, since early grazing checks grass growth and gives clover a better chance. Changing the grazing method makes it possible to establish either a clover-dominant or a grass-dominant pasture. Ample supplies of minerals are indicated since clovers use much P_2O_5 and K_2O . Although little N is needed, a small amount sometimes will aid the crop in getting established on poor soils. N may well be used on the rotational or meadow type of pasture where early cut hay or grass silage is sought as well as a good aftermath, but not upon permanent pasture where wild white clover is grown.—H. M. Steece (courtesy of Exp. Sta. Rec.).

4840. NEHRING, K. Der Einfluss von Reaktion und Düngung auf die Zusammensetzung und die Verdaulichkeit des Wiesengrases. Landw. Jahrb. 86(2): 245-279. 1938.

—The botanical composition of meadow vegetation is con-—The botanical composition of meadow vegetation is considerably changed by variations in fertilization of moor soils. Timothy becomes predominant and legumes are favorably influenced by complete fertilization. A P deficiency causes an increase in weeds; K₂O deficiency does not greatly affect the proportion of weeds. This suggests a useful method of distinguishing between K₂O or P deficiency on a given area. P and K₂O applications are necessary for high yields of hay but N requirements are largely supplied by the soil. The P₂O₅ content of the hay was usually less than 0.33% in cases of P deficiency in the soil and that of K₂O was less than 1% by potash deficiencies. The annual withdrawals of mineral nutrients from the soils receiving complete fertilization were 100-165 kg. N. 140receiving complete fertilization were 100-165 kg. N, 140-180 kg. K_2O_1 , 32-36 kg. P_2O_3 and 50-90 kg. lime per ha. The heaviest withdrawals, except P2O5, are from low moor peat soil. The content of crude protein in the hay was increased and the crude fiber decreased by fertilization but no significant diffs. were shown in the fat content and N-free extracts. Expts. with sheep indicated the highest digestibility (65-70%) of hay following complete fertilization. The total yield of digestible constituents was increased by 50% to 100% by fertilization. Liming an acid high moor soil to 100% by tertilization. Liming an acid nigh moor soli increased the yield of digestible constituents by 30%. Applications of 60 kg. P₂O₅ and 160-240 kg. K₂O per ha. are recommended for desirable results.—I. C. Feustel.

4841. RECIDORO, HORACIO C., and J. M. CAPINPIN. A study of floral biology and boll setting of cotton. Philippine Agric. 27(7): 558-577. 1 fig. 1938.

4842. RODRIGO, P. A. Acclimatization of soybean in the Philippines: I. Philippine Jour. Agric. 9(3): 223-252. 6 pl. 1938.—After 4½ years of acclimatization work on 56 vars. of soybeans introduced from India, Japan, China, the Federated Malay States, and Ceylon some rather heavy yielding vars. both in the rainy and the dry season plantings have been found. The maximum yield of the best vars, does not exceed 25.3 cavans (54 bushels).—M. Manresa.

4843. ROMM, HARRY JOSEF. Notes on the noxious weeds of Macon County, Alabama. Castanea Jour. So. Appalachian Bot. Club 3(3): 29-32. 1938.

4844. SCHMITT, L. Zur Frage der Dicyandiamide-Wirkung im Kalkstickstoff. Landw. Jahrb. 86(3): 501-508. 1938.—The effects of complete fertilization with varying admixtures of dicyandiamide (from 1 to 20%) in the fertilizer were investigated on 8 soil types. No injury resulting from the use of dicyandiamide and no apparent effect on N assimilation by potatoes and oats were noted.—I. C. Feustel.

4845. SKILBECK, D. Weed control in mechanized farming. Papers and Discuss. Oxford Farm. Conf. 3: 141-152.

1938.

4846. SMITH, ORA. Green manure crops for potatoes. Amer. Potato Jour. 15(8): 219-225. 1938.—9 potato rotations are being conducted in 3 widely separated locations in New York State. Potatoes continuously with and without manure and cover crops are being compared with potatoes in 2-and 5-year rotations. On the limestone area, potatoes continuously with manure had higher stands than those

without manure. Following alfalfa the stands have been lower than in any other rotation. On acid soils the poorest stands occurred following pea beans and potatoes continuously without cover crop, manure or commercial fertilizer. Potatoes grown continuously with manure applications remained green much longer than those without manure. Highest yields usually were obtained from cropping systems of continuous potatoes, receiving manure, and the lowest yields following pea beans either in two- or five-year rotations and following corn plowed under as a green manure.-O. Smith.

4847. STAPLEDON, R. G. Ley-farming and a long-term agricultural policy. Rept. Brit. Assoc. Adv. Sci. 108: 245-

262. 1938.

4848. STEVENSON, F. J., and C. F. CLARK. The Sebago potato, a new variety resistant to late blight. U. S. Dept. Agric. Circ. 503. 1-6. 2 fig. 1938.—The Sebago potato, a new var. selected for its resistance to late blight from a cross of Chippewa and Katahdin, is descr. In repeated tests for 7 years it has proved moderately resistant to late blight, and highly resistant to mild mosaic. It is a vigorous growing variety that produces high yields of tubers of high market and cooking quality. It seems to be adapted to Maine conditions and to certain localities in New York State. Because of its lateness it will probably be better adapted to late-potato sections than to early producing ones. It ought to be especially valuable in the parts of late-potato sections subject to epidemics of late blight that cause serious losses in spite of attempts to

control the disease by spraying.—Auth. summ.
4849. STRANTZ, A. von. Die Wasserversorgung in den ländlichen Wirtschaften. Landw. Jahrb. 85(3): 365-384. 1938.—Water utilization and consumption on the farm are

discussed.—I. C. Feustel.

4850. THOMSON, J. R. Cross- and self-fertility in infoin. Ann. Appl. Biol. 25(4): 695-704. 1938.—The sainfoin. number of flowers per raceme is slightly greater in common sainfoin (Onobrychis sativa) than in the giant var. Little more than half the flowers set seed under conditions of open pollination. When the flowers were protected and left untouched the self-fertility was 0.98%. When the flowers were artificially self-pollinated by tripping the self-fertility was 5.11%. Seedlings grown from selfed seed showed poor establishment and reduced vigor. Flowering the seeding year in common sainfoin is apparently not due to the fertilization of the parent plants by pollen from giant sainfoin.—J. R. Thomson.

4851. VASS, A. F., and ROBERT L. LANG. Vegetative composition, density, grazing capacity and grazing land values in the Red Desert area. Wyoming Agric. Exp. Sta. Bull. 229. 1-70. 2 fig. 1938.—The square foot density method of vegetation surveys was used in a study of the Red Desert area of Wyoming. Vegetative types were mapped and counts of living, dead, and young plants were made on the 4 most common species of browse plants in the area, namely: Artemisia tridentata, Eurotia lanata, Atriplex nuttallii, and A. confertifolia. Grazing capacities were computed for the various vegetative types, basing the forage acre requirement on the history of 1,800,000 acres of controlled grazing land within the area. The forage acre factor was based on the palatability tables of the U.S. Forest Service. The survey showed that 32% of the area was of the Artemisia tridentata-Agropyron type with a grazing capacity of 1.64 acres per sheep month. Atriplex nuttallii in pure stand had the highest grazing capacity of .95 acres per sheep month. The average grazing capacity for the area as a whole was 18.60 acres per sheep and 131.75 acres per cow for year around grazing. Counts of living, dead, and young plants of the species previously mentioned show a sufficient number of young plants to replace those which had died even allowing for high natural mortality in the replacements. Comparisons between the controlled grazing area and the area immediately surrounding, based on the Artemisia tridentata-Agropyron type, showed no difference in grazing capacity between the two.—R. L. Lang.

4852. WOODMAN, H. E., and R. E. EVANS. Nutritive value of pasture. XII. The influence of cutting at monthly intervals over 9 seasons on the quality and productivity of a heavy-land pasture. Jour. Agric. Sci. 28(4): 581-591, 1938.

-13 subplots in a permanent pasture on heavy-clay soil, varying in manurial treatment, were cut at monthly intervals for 9 seasons. Weather conditions varied greatly, ranging from extreme heat and drought to abundant, welldistributed rainfall. Monthly cutting did not lower the productivity of the plots or the quality of herbage, as judged by chemical and botanical composition. All plots received autumnal dressings of farmyard manure, hence the investigation did not show whether fertility and productivity of pasture could be maintained under such a system of cutting by artificial fertilizers alone.—T. D. Jarvis.

4853. WOODMAN, H. E., and R. E. EVANS. Nutritive value of pasture. XIII. An enquiry into the residual effects of the intensive use of sulphate of ammonia on pastures. Jour. Agric. Sci. 28(4): 592-597, 1938.—After 5 seasons of continuous cuttings of subplots at monthly intervals (1929-33 inclusive), during which time the A subplots had received 18½ cwt. per acre of (NH₄)₂SO₄, it was decided to submit the question of residue effect to practical test. During 1934-1935 none of the subplots received (NH₄)₂SO₄ although autumnal dressings of farmyard manure were applied as before. During 1936 three of the A subplots were again given (NH₄)₂SO₄, 5 dressings each at rate of § cwt. per acre during Feb., Mar., Apr., July and Aug. The remaining A subplots received none. Yields of all subplots were determined under a system of monthly cuts. Results: striking decrease in yield of A subplots during 1934-35. In 1934 the fall in productivity was accompanied by decreased protein content of herbage. This decrease was not observed in 1935. Growth of bottom grass in A subplots was much thinner.—Artificial stimulation of growth over a period of years by use of (NH₄)₂SO₄ had evidently reduced the inherent vigor of the grasses. When stimulation was removed they displayed slower growth than grasses which had not been stimulated. That recovery of vigor is possible was shown by results in 1936 on all A subplots both with and without use of $(NH_4) \approx O_4$ —T. D. Jarvis.

4854. WOODMAN, H. E., et al. Nutritive value of pasture. XIV. The influence on yield and composition of a single heavy dressing of sulphate of ammonia compared with that of periodic small dressings throughout the season. Jour. Agric. Sci. 28(4): 598-603. 1938.—Expts. were conducted during 1932 and 1933 to determine whether single heavy dressings of 3½ cwt. per acre of (NH₄)₂SO₄, applied in Feb., would have the same effect upon yield improvement as an equal amount divided into light dressings and applied in Feb., Mar., April, May and July. The heavy early dressings were successful only under specially favorable climatic and weather conditions. In the southern half of England best results apparently would be obtained from 3 dressings, applied during most active growth periods: moderate applications in Feb. and late Apr. and smaller

applications during July .- T. D. Jarvis. 4855. ZELENY, LAWRENCE, and D. A. COLEMAN. The chemical determination of soundness in corn. U.S. Dept. Agric. Tech. Bull. 644. 1-23. 1938.—Chemical changes associated with deterioration of shelled corn have been studied. Increase in titratable acidity during deterioration is very marked. The titratable acidity is due principally to 3 classes of acidic compounds, namely, free fatty acids, acid phosphates, and amino acids. The increase in titratable acidity during early stages of deterioration is due almost entirely to free fatty acids. Amino acids and acid phosphates increase significantly only during relatively advanced stages of deterioration. A high correlation exists between fat acidity and an arbitrary "soundness score" based on damaged kernel content, germination, and the various acid components. A simple and rapid method for determining fat acidity in corn has been devised which should prove valuable in the routine evaluation of soundness in com-

mercial corn.—Authors.

SOIL SCIENCE (EDAPHOLOGY)

4856. AQUINO, D. I., and J. P. MAMISAO. Soil survey of the Maquiling area. Philippine Agric. 27(8): 647-665. Map, 2 fig. 1939.—An area of 32,751 ha. around Mount Maquiling is covered in this survey. 5 soil series represented by 15 soil types are delineated. The soils of the area are sedentary from volcanic tuff and ash. The surface soil and the subsoil were acidic. The colloid content of the soil types in a series varied directly with the texture of the soil; i.e., colloids increased as the soil became heavier .- M. Manresa.

4857. BROWN, L. A. Soil survey of Hayes County, Nebraska. U. S. Dept. Agric. Bur. Chem. and Soils 1934

(11): 1-41. Map, 1 fig. 1938.

4858. DOPTER, P. Essai de dosage d'argile par photométrie. Ann. Agron. [Paris] 8(6): 769-776. 1938.—Where métrie. Ann. Agron. [Paris] 8(6): 769-776. 1938.—Where A is variation of optical density, read in diffused light at 90°, with varied clay conc., and B is variation of optical density, read in transmitted light at 90°, with varied clay conc., a relation exists between the product, AB, and the progressive increase of the optical density, measured in transmitted light, as the clay colloid conc. of the suspension increases. With 4 clays—red, grey, green and yellow—rapid, satisfactory results were obtained.—R. R. McKibbin. 4859. KERR. H. W. and C. R. von STIEGLITZ. The

4859. KERR, H. W., and C. R. von STIEGLITZ. The laboratory determination of soil fertility. Techn. Commun. Bur. Sugar Exp. Stat. Queensland 9/10: 179-203. 1938.

4860. KERR, H. W., and C. R. von STIEGLITZ. Some studies in soil sampling technique. Techn. Commun. Bur. Sugar Exp. Stat. Queensland 9/10: 205-217. 1938.

4861. PURI, AMAR NATH, and M. L. PURI. Interaction between carbonates and soils. Soil Sci. 46(5): 401-408. 1938.—The reaction of Na₂CO₃ with common soluble acids, soil acidoid, insoluble acid, calcium salts and calcium soils was studied; also the reaction of CaCO₃ with common soluble acids, soil acidoids, Na salts and Na soils. Soils were exhausted of exchangeable bases by HCl and the resulting H soils were neutralized with the corresponding hydroxides to form Ca and Na soils. The soil acidoids and single-base soils behaved like true acids and salts respectively in their reaction with the carbonates. The method of finding the lime requirement of soils was considered in relation to these reactions with CaCO_s.

4862. RADER, LEWIS F. Jr., and W. L. HILL. Determination and occurrence of boron in natural phosphates, superphosphates, and defluorinated phosphate rocks. Jour. Agric. Res. 57(12): 901-916. 1938.—The Chapin method, modified to the extent that only one indicator is required in the titration, was applied to the detn. of the small quantities of B occurring in natural phosphates and superphosphates. Results are given for B in 54 samples of natural phosphates. At the phosphates are given for B in 34 samples of natural phosphates from various deposits of the world, 9 samples of superphosphates, and 3 samples of defluorinated phosphate rock. The results for acid-soluble B (B₂O₈) in natural phosphates range from < 10 to 144 p.p.m., in superphosphates from < 10 to 158 p.pm., and in defluorinated

phosphate rock from 20 to 30 p.p.m.—Auth. summ.
4863. SCHWIND, RICHARD. Der Einfluss von Grubber, Pflug, Klausing-Pflug und Fräse auf Wachstumsbedingungen und Erträge unserer Kulturpflanzen; ein sechsjahriger Bodenbearbeitungsversuch. Landw. Jahrb. 86(6): 928-988. 1938.—No definite conclusions were evident with respect to soil moisture contents in relation to the different cultural practices from 2 yr. results. "Klausing" cultivation (subsoil plowing), however, resulted in a slight advantage in the avg. moisture content to the investigated depth of 40 cm. on fallow ground. Precipitation and character of vegetation are of primary significance. Plowing appeared to favor the most uniform distribution of moisture. Both the ordinary plow and the "Klausing" plow cultivation allow heavy rains to sink in more readily and thus moisture becomes more quickly available to plants. The temp, of the soil is influenced by cultural treatment. The "Fräse" (a special surface cultivator) gave the most favorable temp. conditions and ordinary plowing the least at the beginning of the vegetative period. Cultivated soil was cooler than uncultivated. Temp. fluctuations, however, are primarily dependent on weather conditions. Surface cultivation results in a more acid soil condition, to the extent of approx. 0.5 pH unit as indicated in KCl extracts; this is noticeable the first year. No acidification resulted from "Klausing" plowing and only after 4 yrs. by ordinary plowing. P fixation accompanies surface cultivation; "Klausing" cultivation contributes to increased P availability.—I. C. Feustel.

4864. TOTH, S. J. The stimulating effects of silicates on plant yields in relation to anion displacement. Soil Sci. 47 (2): 123-141. 1 pl. 1939.—Adsorbed phosphate ions were displaced from a Colts Neck loam by hydroxyl, silicate, silicate at pH 7, and sulfate ions. The pH of the displacing anion solns. governed, largely, the displacement. The anions amon soms, governed, largery, the displacement. The amons were classified into 2 groups with reference to the mobilization of phosphates. The anions of group one (hydroxyl and silicate) yielded large mobilization of P₂O₅ (80-100% of the total adsorbed) and high pH's; the anions of group 2 (silicate at pH 7 and sulfate) yielded inferior mobilization (5-21% of the total adsorbed) of P₂O₅ and pH values because of sold 7. Violated forthers and phosphates and sulfate total adsorbed beat and sulfate total adsorbed beat and sulfate to the sold and phosphates. tween 6 and 7. Yields of soybeans, rape, barley, and sudan grass from pot expts. with and without phosphates and silicates are discussed from the viewpoint of anion displacement. Silicate additions stimulated the yields of barley and sudan grass. No relation existed between the yields from the silicated section and available phosphates in these

soils. Increased absorption of SiO₂, P₂O₅ were noted in the plants grown on the silicated soils.—S. J. Toth.

HORTICULTURE

F. C. BRADFORD, Editor

(See also in this issue Entries 3448, 3507, 4760, 4814, 4837, 4902, 4915, 4930, 4964, 4983, 5000)

4865. BUROVÄſA, L. N. Fěrměntätionoé osäzhdegnié pěktinov v fruktovo-fagodnykh sokäkh. [Fermentative precipitation of pectins in fruitberry juices.] [In Russ with Germ. summ.] Biokhimia 3(4): 522-528. 1938.—Active pectase for clarifying fruit juices was obtained from dry leaves. The small yield and complexity of method of isolation rendered the method impractical.—E. K. Johnson.

4866. ASHPLANT, H. Plantation research. Is there a best tapping system? India-rubber Jour. 96(9): 265-267. 1938

4867. ASHPLANT, H. Plantation research. Some recent experiments discussed. India-rubber Jour. 96(10): 287-288.

4868. CUMMINGS, M. B., and R. G. DUNNING. A study in recovery of transplanted apple trees. Vermont Agric. Exp. Sta. Bull. 432. 1-24. 4 pl. 1938.—Following transplanting, growth of young bearing apple trees was hindered, development retarded, and fruit production deferred. The inhibiting effect on growth was manifested in reduced twig elongation and number of leaves. Even in the 3d year after moving, the transplants were greatly behind the controls in production. The hardier vars. among the transplants, such as Cortland, Haralson, and Lawver, bore most of the

fruits. The methods of transplanting are discussed.—J. W. Wellington (courtesy of Exp. Sta. Rec.).
4869. DARROW, GEORGE M. The Northstar strawberry.
U. S. Dept. Agric. Circ. 517. 1-2. 1 fig. 1938.—The Northstar var. originated as a cross between Howard 17 and Redheart and is introduced for northern U. S. because of its high yield of large, tart, firm berries of high dessert quality. It is described and its qualities discussed.—G. M. Darrow.

4870. DWYER, R. E. P. Investigations on some natural forest products in New Guinea. New Guinea Agric. Gaz. 4(2): 23-29. 1938.—A discussion of Parinari laurina, source of the kusta nut, and analyses of the properties of these nuts.-W. D. Pierce.

4871. EMSWELLER, S. L. Chrysanthemum breeding. Bull. Chrysanth. Soc. Amer. 6(3): 3-8. 1938.
4872. GUTIERREZ, MARIANO E. Plant-to-the-row tests

on seedlings of strawberry. Philippine Jour. Agric. 9(4): 335-345. 5 pl. 1938.

4873. MAJLERT, W. Badania nad trzema odmianami rabarbaru, co do ich plennosci, cech morfologicznych i zmian chemicznych, zachodzachych w okresie wegetacji. [Studies of morphology, yields and changes in chemical

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composition of three varieties of rhubarb.] [In Polish with Eng. summ.] Roczniki Nauk Ogrodniczych (Ann. Sci. Hort.) [Warsaw] 5: 1-33. 1938.—Harvesting 3-4 times at 2-week intervals gave significant weight increases of total crop, as compared with single end season harvest, of 23% for Victoria and for Sutton. Increase in no. of petioles was 51% for Victoria, 45% for Dawes Challenge, and 42% for Sutton. There were no significant differences in total yields between varieties, when several harvests were made. Victoria is the earliest variety. In the following year the plants from which a single harvest had been taken made more vigorous growth. Petioles did not differ significantly in length; those of Sutton were heavier in all harvests. Dry matter per cent increases with age and as the season advances. Total sugar decreases slightly through the season, but increases with age. Total acidity increases as the season advances and is affected by age. Victoria was lowest in total oxalic acid; water soluble oxalic acid content was similar in all varieties. With age, water soluble oxalic acid decreases slightly and total (mainly calcium oxalate) increases markedly.—From auth. summ.

4874. MURPHY, M. M. Jr., T. A. PICKETT, and F. F. COWART. Muscadine grapes: Culture, varieties, and some properties of juices. Georgia Agric. Exp. Sta. Bull. 199. 1-32. 15 fig. 1938.

4875. MURRAY, GEORGE H. Green manuring and cover crops for coconuts. New Guinea Agric. Gaz. 4(2): 2-8. 1938.—The plants best suited for green manuring coconuts in New Guinea are Calopogonium mucunoides, Centrosema

pubescens, and Pueraria javanica.—W. D. Pierce.
4876. RODRIGO, P. A. Notes on the propagation of the Ponderosa chico. Philippine Jour. Agric. 9(4): 357-363. 5 pl. 1938.—Until recently marcotting was the only method of propagating the native chico, Actras zapota, in the Philippines. 4 methods of propagation were tested in the present exp.: marcotting, grafting, inarching and by seed. Inarching gave the highest percentages of success, followed by grafting; marcotting gave the poorest result. Ponderosa chicos planted by these methods began to flower in 1-2 years after setting them in the field; trees grown from seed required about 8 years to flower.—M. Manresa.

4877. SCHULTZ, ENRIQUE F. Apuntes sobre fruiti-

cultura en Tucuman. [Memoranda concerning fruit culture in Tucuman.] Rev. Indust. y Agric. Tucuman 27(4/6): 85-89. 4 fig. 1937(1938).—The climate and soils of Tucuman are favorable to the production of fruits of a wide range of spp. and vars. The list of fruits commercially grown includes the ordinary stone, pome and drupe fruits; and most spp. and vars. of *Citrus*. On a lesser scale are also papaya, pomegranate and banana. The fine quality of the apples and oranges is mentioned. At the expt. station of Tucuman are more than 100 vars. of Citrus gathered from all citrus regions of the world, and from these superior strains are being selected. The outlook for an increase in fruit production, especially Citrus, is promising.-J. W. Gilmore.

4878. SHÏVRÏNÄ, A. N. Sootnoshënië kärotinoidnykh pigmëntov v sortäkh tomätov. [The ratio of carotinoid pigments in varieties of tomatoes.] [In Russ. with Ger. summ.] Biokhimia [Biochem.] 3(4): 541-545. 1938.—Relative carotin and lycopin content varies in different vars of tomatoes. Carotin and lycopin accumulate and xanthophyll decreases during ripening, the first 2 reaching a maximum and the 3d a minimum at full ripening. On overripening, there is a marked decrease in carotin and vitamin

C and an increase in xanthophyll.—E. K. Johnson.

4879. TECSON, ALFONSO L. A preliminary survey of the watermelon industry in Bulacan and Pampanga.

Philippine Jour. Agric. 9(4): 365-379. 5 pl. 1938. 4880. WALTMAN, C. S. The first season's growth of apple grafts as affected by type of stock and part of cion. Kentucky Agric. Exp. Sta. Circ. 49. 1-11. 1938.—Comparison of whole- and piece-root grafts and top and basal portions of scions showed no significant difference in either height or diam. growth of the resulting trees at the close of the first growing season. The number of small trees was nearly the same in the different groups, but mortality % was considerably greater with piece roots than with branched whole roots. Equally good results were obtained by using the tip or the basal half of the scion. In all lots there was noted a high degree of correlation between height and diam. in the young trees.—J. W. Wellington (courtesy of Exp. Sta. Rec.).

FORESTRY

W. N. SPARHAWK, Editor

(See also in this issue Entries 3429, 3500, 3501, 3503, 3510, 4791, 4794, 4870, 4906, 4931, 4988, 5003, 5049, 5051, 5052)

4881. BLOKHUIS, J. L. W. Het kweekerijbedrijf. [Forest nursery operation.] Nederland. Boschbouw-Tijdschr. 12(1): 1-11. 1 fig. 1939.—Methods of establishing and operating forest nurseries in the Netherlands are descr.

-W. N. Sparhawk.

482. BORNAND, J. L'évolution intéressante d'une petite forêt communale. Jour. Forest. Suisse 90(1): 1-6. 3 fig. 1939.—The commune of Vallamand in Canton Vaud, Switzerland, owns a 30-ha. forest, acquired by reversion and purchase of 196 parcels formerly owned by individud for the commune of the parcel of the p citizens. The 1st management plan, in 1926, provided for an annual cut of 3.6 cu.m. per ha., or 1.9% of the stand, which consisted mainly of spruce and fir of all ages. During 1926-1938 this was largely an improvement cutting to remove the inferior and defective trees. After 12 yrs., 48 cu.m. per ha. had been cut and the remaining stand had increased to 255 cu.m. (70 cu.m. per ha. more than at the start). The average tree was larger and the proportion of trees over 50 cm. diam. was greater than in 1926.—W. N. Sparhawk.

4883. DESCH, H. E. The forests of the Malay Peninsula and their exploitation. Malay Forester 7(4): 169-180. 4 pl.

1938.

4884. DREES, E. MAIJER. Kort overzicht der geslachten Intsia en Pahudia. [Brief survey of the genera Intsia and Pahudia.] [With Eng. summ.] Tectona 31(12): 851-863. 2 fig. 1938.—These are important timber trees; the wood of the various spp. is hardly distinguishable and is known as marbau. Only I. palembanica is promising for cultivation. As natural regeneration is impractical, planting stock

will have to be grown in nurseries. The seed germinates slowly. Early growth is rapid.—W. N. Sparhawk.

4885. FRIC, JAN. Českoslovenští lesníci v lesich

švýcarských. [An excursion of Czech foresters in the Swiss forests.] [With Ger. and Fr. summ.] Lesnickà Práce 17 (11/12): 573-614. 20 fig. 1938.—Swiss forests and their

management are descr.

4886. GERLINGS, J. H. JAGER. Het een en ander over het gebruik van exoten in den boschbouw. [Pro and con use of exotics in forestry.] Nederland. Boschbouw-Tijdschr. 12(1): 12-22. 1939.—The use of exotic trees is desirable in the Netherlands because the native flora includes so few spp. and because the soils available for forestry are mostly poor and degraded, so incapable of supporting good stands of the native spp., at least for the 1st tree generation.— W. N. Sparhawk.

4887. GORTNER, W. A. Analyses of glacial and pre-glacial woods. *Jour. Amer. Chem. Soc.* 60: 2509-2511. 1938. —Two samples of preglacial spruce wood (Pre-Nebraskan) and 2 samples from the Peorian interglacial period were analyzed in comparison with modern white spruce. The analyses show an increased ash content with age of burial, presumably due to the infiltration of inorganic salts from the earth. The pentosans and cellulose decrease with in-crease in age of the wood with lignin showing an apparent increase. It is believed that this lignin increase is only apparent and is due to the decrease in cellulosic constituents. Correcting to a constant lignin basis, there still remained in the wood which had been buried in the earth 700,000 to 1,000,000 years approx. 7 to 15% of the original "holocelluloses" and 9 to 10% of the original "pentosans."—H. N. Glassman.

4888. GÖTZ. Zum Aufsatz im "Deutschen Forstwirt", "Schlechtformigkeit und Schlechtrassigkeit" von Professor Schmidt. Allg. Forst- u. Jagdztg. 115(1): 8-20. 5 fig. 1939. —Studies in Silesia show that there are distinct subspp. or races of Pinus silvestris, varying from scrubby trees of low value to those of excellent form and high value. Contrary to Schmidt's views, there is no relation between phototropism and coarse branching, hence seedling diagnosis based on phototropism cannot indicate the type of tree.—W. N. Sparhawk.

4889. GUILLEBAUD, W. H. The afforestation of difficult peat and upland heath soils. Forestry 12(2): 80-92. 1938. The paper—an extract from the Annual Progress Report on the Research Work of the Forestry Commission of Great Britain for 1937—summarizes the results of a series of plantation exps. established during the past 15 years and concerned with various aspects of the treatment of certain difficult types of soil. On poor types of peat in the northwest of Scotland the effect of planting on upturned blocks of peat, called turfs, is very pronounced, though in addition the use of a small quantity of phosphatic manure is often found to be necessary in order to obtain satisfactory growth of such spp. as Picea sitchensis and Pinus contorta. Soil cultivation before planting is shown to promote the growth of all species suitable for planting on upland heaths though on the poorest types of this class of land phosphatic manuring (either with basic slag or ground mineral phosphate) appears necessary even for such non-exacting spp. as Scots pine and Pinus contorta. In the last section of the paper exps. on the use of mixtures of pines with spruces are descr. and a number of cases instanced in which an admixture of pines appears to have improved the growth of the spruce. These exps. were on podsolized heather-clad soils.—W. H. Guillebaud.

4890. HARTMANN, FRANZ. Waldbodenprofil-Charaktertypen, ihre Naturgesetzlichkeit, Eigenart und waldbauliche Bedeutung. Centralbl. Ges. Forstwesen 64(7/8): 199-207; (9): 223-230; (10): 241-257; (11): 273-283. 1938.—Soil types are discussed in relation to climate, humus formation, and biological activity; also the interrelation of soil formation and forest vegetation. There are 2 groups of forest soils: those with mild and those with acid humus. Soil profile types of the 1st group are: lime-black earth, rendzina or humus-lime soil, red earth, and yellow, brown, or black earth. Those of the acid group include: alpine mold, fine mold of the lowlands and middle altitudes, heath forest soil, and high moor (swamp forest) soil. For each of these types the climate, soil origin, vegetation, and profile and its development are described. Due consideration of soil structure is essential in silvicultural management; poor results, including growth stagnation and failure of natural regeneration, have often followed endeavors to apply methods unsuited to the site.—W. N. Sparhawk.

of natural regeneration, have often followed endeavors to apply methods unsuited to the site.—W. N. Sparhawk.
4891. HERTZ, MARTTI. Metsähallitus 1859-1934.
[The Forest Service of Finland 1859-1934.] [With Ger. summ.] Acta Forest. Fennica 43(1): 1-172. 6 portraits, 4 fig. (1934)1938.

4892. KEET, J. D. M. (Director). Division of Forestry, Union of South Africa, Annual Report for the year ended 31st March, 1937. 61p. 8 pl. Gov't Printer: Pretoria, 1937 (rec'd 2-7-38).—This is the regular administrative report, with statistical tables covering the operations in the State forests during the yr. 6½ pp. are devoted to research, including silvicultural and forest products investigations. Much of the work relates to the cultivation and utilization of the various of state products. W. Santhark

of the various spp. of exotic pines.—W. N. Sparhawk.

4893. KNIGHT, R. A. G., and R. J. NEWALL. Permanent set of timber. Forestry 12(2): 124-134. 1 pl. 1938.—

If the normal swelling of timber consequent upon moisture absorption is restrained, a more or less permanent size deformation becomes apparent after the wood has re-dried to its original state. Experiment with beech showed that the ultimate size diminution is approx. half the suppressed movement. During restraint, the equilibrium moisture content of the wood is lowered, this being in agreement with Katz's equation for the swelling pressures of hygroscopic materials. Set can be largely but not entirely relieved by rewetting the wood under restraint-free conditions.—

Authors.

4894. MAŘAN, BOHUSLAV. Stanovištní studie v porostech se smrkovým podrostem. [Observations on the microclimate and soil in stands with spruce understory.] [With Ger. and Fr. summ.] Lesnická Pràce 17(11/12): 615-646. 6 fig. 1938.—Observations were made in pine stands with and without spruce understory, and in oak stands with an understory. The air temp. 20 cm. above the ground was higher in morning, evening, and on cool days than in stands without the understory, and the diurnal temp. range was less. The soil at 5 cm. depth was warmer in the morning and cooler at mid-day than in stands lacking an understory; at 25 cm. depth it was slightly cooler at all times. Soil of the eluvial horizon was drier and that of the illuvial horizon wetter under pure pine than underpine with an understory. Soil was more porous in the upper layers and less so in the lower layers where spruce was present. In oak with a spruce understory the soil was drier in all horizons and less porous than where there was no spruce. The organic content and the amount of mineral plant nutrients in the upper layers of soil were greater in both pine and spruce stands with an understory. W. N. Sparhawk.

4895. MERTEN. Zur Holzvorratsaufnahme in den Preussischen Staatsforsten. Erfahrungen und Vorschläge. Zeitschr. Forst- u. Jagdw. 70(12): 609-630. 1938.—Methods of making the timber survey in the Prussian State forests are descr. The cost averages about RM 3.50 per ha. Owing to the cost and the difficulty of getting qualified personnel, frequent repetition of such surveys for the purpose of regulating the cut is impractical. Repetition every 20 yrs. is suggested. Only the trees over 80 yrs. old need be calipered (60 yrs. for especially valuable timber); younger stands can be estimated from yield tables.—W. N. Sparhawk.

4896. ROUX, G. Le pin maritime en Basse-Bretagne. Rev. Eaux et Forêts 76(12): 991-996. 1938.—Pinus pinaster has been planted extensively in the departments of Morbihan and Finistère, Brittany, for fixing dunes and producing timber. Plantations total some 16,000 ha. It does better than P. silvestris in a strip about 15 km. wide along the coast, which is characterized by strong winds and warm climate, but P. silvestris is preferred farther back.—W. N. Sparhawk.

4897. RůžičKA, JAROSLAV. Murrayoka (Pinus murrayana Balfour). [With Eng. summ.] Lesnická Práce 17 (11/12): 646-650. 1938.—Lodgepole pine has been grown in Germany and Czecho-Slovakia for some 40 yrs. It surpasses native spp. on poor sites, but in Bohemia, at least, is not as promising for forestry use as P. strobus.—W. N. Sparhavk.

4898. RYLE, G. B. The protection of plantations against fire. Forestry 12(2): 65-79. 1938.—In laying out new forest plantations the fire protective requirements of the grown forest must be considered jointly with the immediate fire system. British forest fires are man-caused and apart from railway fires are principally due to an ignorant or careless public. In young plantations different types of ground flora have important bearings on fire risk. Economy but not parsimony in fire protection layout and organisation is essential, the main items being the formation of firelines and fire-belts, simple and adequate equipment and a well conceived system of collecting an army of fire fighters.—G. B. Ryle.

4899. SPEER. Über die Genauigkeit einiger Massenermittlungsmethoden, dargestellt an praktischen Beispielen. Allg. Forst- u. Jagdztg. 114(12): 385-401. 5 fig. 1938.—The trees on plots in 87-yr.-old spruce, 100-yr.-old pine, and 110-yr.-old beech stands were cut and carefully measured, to check the accuracy of various methods of determining the vol. of standing timber. Speidel's volume-curve method, using all of the trees, gave results within 0.6% of the correct vol.; when only 10 sample trees were used the error was over 4%. The basal-area average tree method gave errors greater than 5%, and Urich's variation of it (5 size-classes) was not much better. Volume-table methods showed even poorer results for some stands. The only method using as few as 10 sample trees that was within 2% was the Kopetzky-Gerhardt volume-line method. Accuracy of any method depends on the particular stand under investigation. If vol. is determined by 2 methods and the results agree, they are probably accurate.—W. N. Sparhawk.

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4900. STEVEN, H. M. Ecological aspects of afforestation in the hill country—criteria in the choice of species. Forestry 12(2): 93-100. 1938.—The criteria which should be used in the choice of species for afforestation in the hill country of Great Britain are considered under aesthetic considerations, economic considerations, factors inherent in the species, and factors inherent in the site. In recent years increasing use has been made of ground or cover vegetation types in the choice of spp., the correlation being made between the non-woodland site to be afforested and existing plantations of different spp. Particularly for the newer exotics for which older woods are still limited, the correlation has been not with intrinsic suitability, but with ease of establishment which is particularly influenced by vegetation type. The view is put forward that this consideration may be unduly influencing choice of species. The stands being created are viewed from the ecological standpoint and their deficiencies considered. Except where mixtures are necessary to secure establishment, pure conifer crops, the species chosen on the basis of the criteria discussed, should be continued, but when the thinning stage is reached suitable tolerant species should be introduced and any coming in naturally favored so that there will be a progressive im-

provement of the site, first by the crop on the microclimate, etc., and secondly from the greater variety of spp. As this will be practicable, in general, only where the crop is formed of relatively intolerant spp., tolerant spp. should be restricted to the richer soils.—H. M. Steven.

4901. WILDE, S. A. Soil-fertility standards for growing northern conifers in forest nurseries. Jour. Agric. Res. 57 (12): 945-952. 1938.—The soils under productive stands of representative conifer spp. (Pinus banksiana, P. resinosa, P. strobus, and Picea glauca) were analyzed for pH value, exchange capacity, total and available N, available P, available K₂O, and replaceable bases. By means of statistical treatment of the data obtained, standards for the maintenance of fertility in conifer nursery soils were established. The analyses of virgin soils showed that the maintenance of investigations in Europe and greenhouse studies at the Univ. of Wisconsin have indicated that the standards established for Pinus resinosa and Picea glauca may be safely applied to Pinus silvestris and Picea excelsa, respectively. General directions for the adjustment of soil conditions are outlined.—S. A. Wilde.

PHARMACOGNOSY AND PHARMACEUTICAL BOTANY

HEBER W. YOUNGKEN, Editor

(See also in this issue Entries 4123, 4782, 4791, 4823, 4870, 5077)

4902. CARL, MAXWELL, ROBERT S. McKNIGHT, BERNARD SCOTT, and CARL C. LINDEGREN. Physiological effects of garlic and derived substances. Amer. Jour. Hyg. Sect. B 29(1): 32-35, 1939.—The use of a chemical as a therapeutic agent is prevented if the bactericidal dose is more lethal to the host than to the parasite. Since the bactericidal value of garlic, onions, and derived substances had been detd. in vitro it was decided to test their toxicity to animals. The sulphides in these vegetables were found to be cumulative poisons to animals, but were only slightly poisonous; lethal dose, about 1.2 g. per kilo body wt. The higher aldehydes, acrolein and crotonaldehyde, were not cumulative poisons and were bactericidal in low concs. Fresh garlic is very poisonous, probably because of the sulphides, and, for this reason, may not be very effective therapeutically. However, there are some indications that the derived aldehydes, especially acrolein, have possibilities as therapeutic agents.—Auth. summ.

4903. FOLKERS, KARL. Preliminary studies of the

4903. FOLKERS, KARL. Preliminary studies of the botanical components of Tecuna and Java curare. Jour. Amer. Pharm. Assoc. 27(8): 689-693. 1938.—Alkaloids which cause a curare-like action in frogs occur in Strychnos peckti, S. sp. nov. (related to S. diaboli), S. jobertiana, S. castelnaeana and S. toxifera. The extracts of two menispermaceous plants—Chondodendron limacijolium and Telitoxicum minutiflorum—are highly toxic, but the curare paralyzing action remains to be studied further. Capparis sold (Capparidaceae) contains alkaloids of curare-like action. Many other plants, as used by the Tecunas and Javas, have been eliminated as not being of interest to the problem of

alkaloids of curare-like action.—K. Folkers.

4904. FOLKERS, KARL, and KLAUS UNNA. Erythrina alkaloids. II. A review, and new data on the alkaloids of species of the genus Erythrina. Jour. Amer. Pharm. Assoc. 27(8): 693-699. 1938.—The literature on the alkaloids of spp. of Erythrina is reviewed; the new data show for the first time the presence of alkaloidal substances, capable of causing a curare-like action in frogs, in 24 spp. of Erythrina.

K. Folkers.
4905. HUDDLE, H. B. A preliminary report on the vacuum fractionation of the oil of Juniperus virginiana.

Jour. Tennessee Acad. Sci. 13(4): 259-267. 1938.

4906. ROWAAN, P. A., en J. W. GONGGRIJP. Onderzoek der balsems van verschillende Pinus-soorten, afkomstig van Noord-Sumatra. [Investigation of the resins of various pines of northern Sumatra.] [With Eng. summ.] Tectona 31(12): 876-880. 1938.—Analysis of the gum of P. merkusii, P. merkusii, and P. khasya showed that P. merkusii yields a higher % of turpentine and better grades of turpentine and rosin than the other spp.—W. N. Sparhawk.

4907. SUNTHANKAR, S. R., and S. K. K. JATKAR. Utilisation of myrobalans. I. Preparation and purification of myrobalan extract. II. Myrobalan oil. III. Utilisation of myrobalan extract for the preparation of ink and for cotton dyeing. Jour. Indian Inst. Sci. 21A(12): 131-147. 2 fig.; (13): 149-152; (14): 153-158. 1938.—The optimum conditions for the extraction, clarification and decolorization of tannic acid from myrobalans were studied and applied to large-scale exps. Alumina and Pb acetate were shown to be unsatisfactory as precipitants. Most of the tannins were extracted by water at 70°. Cooling the extract to 15° caused the separation of a good deal of colloidal matter without appreciable loss of tannins. Data on the sp. gr., refractive index, acetyl value, and optical rotation of the oil, and physical constants of the mixed fatty acids, liquid unsatd. fatty acids, and solid fatty acids were detd. Composition of oil approaches that of peanut oil and the oil is of little commercial value due to the smallness of the quantity present in the myrobalan. Inks prepared from myrobalan extract and purified myrobalan tannic acids compare favorably with well-known inks on the market. The use of these tannic acids as mordants for dyeing was studied. Their yellow color makes them unsuitable for bright shades, but does not affect medium and deep shades.—R. D. Bienfang.

4908. VAROSSIEAU, W. W. Microscopical anatomy of tropical plants. I. Anatomical and microchemical observations on the leaf of Palaquium gutta Burck. Ann. Jard. Bot. Buitenzorg 48(3/4): 153-172. 2 pl., 6 fig. 1938.—Getah occurs in the leaf of P. gutta (1) in the central vacuole of certain cells, chiefly in the palisade cells and in the guard cells of the stomates; and also (2) within latex vessels. parenchyma cells the getah is present in isotropic droplets or in anisotropic crystals, the latter melting at \pm 53° C. The getah droplets seem to originate in the protoplasm. They enlarge, are pushed inward and enter the vacuole. In dried leaves the cellular getah occurs exclusively in radially arranged crystallites. Crystalline getah may be obtained from isotropic liquid getah and vice versa. Palaquium leaves contain latex vessels, originating from rows of parenchymatous cells in meristematic tissue. The vessels are sometimes branched, but do not anastomose. A hyaline mass seems to surround the latex droplets both in the cells and in the vessels. A tannin-starch compound is probably formed necrobiotically, often occluding getah-particles. These tannin inclusions do not show the iodine reaction on starch. - W. W. Varossieau.

4909. VOIGT, RALPH F., CHARLES H. ROGERS, and EARL B. FISCHER. A pharmacognostic study of Chrysanthemum balsamita L., var. tanacetoides Boiss., together with

a study of its volatile oil. Jour. Amer. Pharm. Assoc. 27(8): 643-654. 3 pl. 1938.—The overground parts contain a volatile oil, the odor of which is almost indistinguishable from that of spearmint. This plant—commonly known as Costmary, Old Maid, Sweet Susan and Sweet Mary—is an herbaceous, woody perennial native to western Asia, from where it was introduced into Europe and the U. S. It has been used for the treatment of many common ailments. Material employed for study was obtained from Michigan, Wisconsin and Minnesota and from plants cultivated in the Medicinal Plant Garden of the Dept. of Pharmacognosy, Univ. of

Minnesota. Study included prepn. of pharmacognostic descriptions and illustrations of the morphology and histology of the flower, leaves, stem, rhizome and roots and a preliminary investigation of the chem. constituents, physical properties and yield of oil. 1-Carvone was identified as the chief constituent of the oil and ranged in percentages from 69.6 to 81.8. The physical constants of the oil were as follows: ds. 0.9473 to 0.9837; ns. 1.4887 to 1.4974; [a] 3-37.92° to -50.63°. Yield of oil obtained by steam distillation of the fresh or partially dried overground parts of the plant was from 0.046 to 0.121%.—E. B. Fischer.

PLANT PHYSIOLOGY, BIOCHEMISTRY, AND BIOPHYSICS

F. E. DENNY, Editor

(See also in this issue Entries 3458, 3504, 3551, 4690, 4692, 4696, 4736, 4825, 4836, 4855, 4865, 4878, 4887, 4975, 4983)

ABSORPTION, NUTRITION

4910. COHEN, BARNEY BARNETT. Effects of flue dust on the growth of sunflower and Golden Wax bean. Plant Physiol. 13(4): 868-871. 1938.—Flue dust from steel mills was used in varying cones. in the soil of 6 test plots. The effects were observed on sunflower and Golden Wax bean. In the case of the sunflower cones. of 1%, which is comparable to additions of fertilizers, have a favorable growth effect; in the Golden Wax bean no favorable growth effects were observed. The dust contains Fe (50%), C (11.53%), Si (10.83%), CaO (3.2%), Al₂O₃ (2.76%), Mg (0.67%), MgO (0.41%), and P (0.246%).—B. B. Cohen.

4911. DONALDSON, FRANK T. A study of mineral

4911. DONALDSON, FRANK T. A study of mineral nutrition of wheat as influenced by fertilizer combinations. Plant Physiol. 13(4): 737-766. 1938.—Five plots of Marquis wheat fertilized with various amounts of NaNOs, KCl and treble superphosphate were the source of wheat plants used to determine the weights of nutrients present at 6 successive stages of development. With few exceptions, dry matter, P, S, and N increased from the first to the last sampling. The effect of the fertilizers on composition could be detected more easily in the young plants than in the mature plants. K reached a maximum at the 2d sampling and suffered a subsequent loss ranging from 29 to 42%. Drought decreased the downward movement of K and the upward movement of Ca, N, P and S. Length of growing season may alter the conclusions drawn from a progressive development study.—F. T. Donaldson.

4912. McCALLA, A. G., and E. K. WOODFORD. Effects of a limiting element on the absorption of individual elements and on the anion:cation balance in wheat. Plant Physiol. 13(4): 695-712. 1938.—Limiting a nutrient supplied to wheat plants grown in soil or in water cultures resulted in increased uptake of another nutrient absorbed as an ion of the same sign, or in decreased total uptake of nutrients absorbed as ions of the opposite sign. When N was limiting, P absorption was increased, as was S absorption in some series. Limiting K was accompanied by increased absorption of both Ca and Mg. Limiting Ca was accompanied by increased absorption of K and Mg, and by slightly decreased absorption of anions. Despite large differences in ratios of individual nutrients as a result of limiting one, there was a marked tendency toward a maintained balance between total anions and cations. This balance was always in favor of the anions.—A. G. McCalla. 4913. PERALTA, FERNANDO de, and DOMINGO B.

4913. PERALTA, FERNANDO de, and DOMINGO B. PAGUIRIGAN. Studies on the salt requirement of tobacco. Philippine Jour. Agric. 9(3): 253-272. 7 pl., 1 fig. 1938.—Studies on the Ilagan Sumatra var. of tobacco germinated in quartz sand show that the most promising nutrient medium for tobacco has about 0.0132 gm.-mol. per liter of all salts, with KH.PO4, Ca(NO3)2, Ca(H2PO4)2, and MgSO4 present in the molecular proportions of 2, 6, 1, and 2, respectively. Besides the usual elements—C, H, O, P, K, S, N, Ca, Fe, and Mg—needed for normal growth of higher plants, a small amount of B is necessary for the development of tobacco to full maturity. Tobacco develops vigorously in a complete nutrient medium containing nitrate-N. When (NH4)2O4 is the source of N, the absence of soil nitrifying bacteria retards or inhibits growth.—M. Mauresa. 4914. THOMAS, WALTER. Foliar diagnosis: Its rela-

tion to the optimum nutrition of the potato. Plant Physiol. 13(4): 677-694. 1938.—The investigations with potato plants reported earlier (Plant Physiol. 12: 571-600. 1937) have been extended to plots treated with rotted horse manure and to commercial fertilizers differently equilibrated. The effect of the different fertilizers on the intensity of nutrition and on the N-P₂O₅-K₂O equilibrium of the 4th leaf from the base is descr. Potash is the principal factor increasing the intensity. A low intensity cannot compensate for a poor NPK equilibrium, whereas a high intensity may. The yields are related in a definite way to the proximity of the values of the mean NPK-units to that of the optimum (manure), which is N:P₂O₅:K₂O=65.0:5.72:29.3.—W. Thomas.

4915. WALL, MONROE E. The role of potassium in plants: I. Effect of varying amounts of potassium on nitrogenous, carbohydrate, and mineral metabolism in the tomato plant. Soil Sci. 47(2): 143-161. 1939.—Rutgers tomato seedlings were grown in sand culture with 0, 44, 175, and 350 p.p.m. of K. The minus-K plants at first accumulated high concs. of carbohydrates as compared to the other series. The carbohydrate conc. in these plants finally fell to a very low value, and was associated with low protein and high soluble organic N concs. The accumulation and decrease of carbohydrates in the K-deficient plants were accompanied by well-defined external deficiency symptoms. The plants receiving 44 p.p.m. of K were the optimum series as judged by fresh and dry weights and carbohydrate content.—M. E. Wall.

AUXINS, GROWTH HORMONES

4916. ALEXANDER, TAYLOR R. Carbohydrates of bean plants after treatment with indole-3-acetic acid. Plant Physiol. 13(4): 845-858. 3 fig. 1938.—Bean plants, Phaseolus vulgaris, grown under greenhouse conditions were decapitated at the 2d internode, and the cut surface treated with 2% indoleacetic acid in lanolin. Analyses of the carbohydrate fractions on the entire plant, using the ceric sulfate method, indicated a translocation of carbohydrates toward the point of treatment and a condition causing simple carbohydrates to be condensed to complex polysaccharides. Dry weight differences between the control and treated plants, as well as the chemical nature of the treated stems, suggested respiratory increases following stimulation by indoleacetic acid.—T. R. Alexander.

4917. GOLDBERG, ETHEL. Histological responses of

4917. GOLDBERG, ETHEL. Histological responses of cabbage plants grown at different levels of nitrogen nutrition to indole(3) acetic acid. Bot. Gaz. 100(2): 347-369. 10 fig. 1938.—Application of a 3% mixture of indoleacetic acid in lanolin made to decapitated first internodes of very young cabbage seedlings caused the development of an apical callus and a crown of adventitious roots. These roots were derived mainly from the rays and phloem. About \$ of the plants produced viable shoots, either directly from the top of the callus or laterally at about the level of adventitious root production from the cortex and rays. Woody plants grown with little N available react much more slowly and to a lesser extent than do those grown with a large supply. The former produce a much smaller and more highly vascularized callus, through which the root primordia rarely protrude.—E. Goldberg.

4918. NAGAO, MASAYUKI. Studies on the growth hormones of plants. IV. Further experiments on the production of growth substance in root-tips. Sci. Repts. Tôhoku Imp. Univ. Ser. 4 13(2): 221-228. 1938.—Excised roots of Pisum sativum and Zea mays were cultured on nutrient agar for 2, 4, and 12 days. Growth substance was obtained from tips of such excised roots (detd. by using Boysen Jensen's dextrose-agar method, also Thimann's chloroform method). When roots were cultured on plain agar no growth substance was detected after the 1st day, and growth ceased after the 2d. These roots resumed growth when transferred to nutrient agar, and growth substance was subsequently detected. The amt. of growth substance apparently increases with an increase of the growth rate.—C. C. Wilkinson.

4919. SKOOG, F., T. C. BROYER, and K. A. GROSSEN-BACHER. Effects of auxin on rates, periodicity, and osmotic relations in exudation. *Amer. Jour. Bot.* 25(10): 749-759. 1938.—A stimulating effect of indole-3-acetic acid on exudation was studied principally in Pisum seedlings grown in the dark and Helianthus plants grown in culture solns, in the greenhouse, but kept in controlled dark rooms during exudation. In Pisum, auxin increases the rate and the duration of exudation. Its effect is modified by an accompanying influence on bud inhibition. Both phenomena are comparably affected with respect to conc. of auxin and to the position of its application to the stems. Nevertheless, the effect of auxin in exudation need not be dependent on its rôle in bud inhibition. In *Helianthus* the stimulating effect of auxin is mainly on the rate of exudation. It promotes the exudation of both water and salts, but may lead to either increases or decreases in conc. of salts in the exudates. The effect of auxin is not due to any increase in total growth of treated plants. It is not a simple osmotic effect, nor is it mainly directly connected with the mechanism whereby solutes are effective in exudation. The rates of exudation and electrolyte concs. of the exudates are greatly influenced by the salts supplied to the external solns. but the ratios of rate of exudation to conc. difference between the exudates and the external solns. may vary over a wide range and are increased by the presence of auxin. Indirect evidence suggests that auxin acts in conjunction with the utilization of food required for continued exudation, since a stimulating effect appears to be limited to plants rich in storage materials. However, non-electrolyte solutes appear to play only a minor rôle directly in exudation and no correlation was obtained between auxin activity or and no correlation was obtained between auxin activity or diurnal cycles in exudation and total respiratory rates. The effect of applied auxin is exerted in the mechanism responsible for the diurnal periodicity in exudation shown to be exhibited by *Helianthus* and it is greatest during the periods of increasing bleeding rates.—T. C. Broyer.

14920. STUART, NEIL W. Nitrogen and carbohydrate

4920. STUART, NEIL W. Nitrogen and carbohydrate metabolism of kidney bean cuttings as affected by treatment with indoleacetic acid. Bot. Gaz. 100(2): 298-311. 4 fig. 1938.—Cuttings of kidney bean seedlings were treated by immersing their bases in 0.01% indoleacetic acid for 4 hours. They were then set in sand in a propagating frame for 120 hours. During this period, in comparison with control cuttings, the treatment brought about a directional shift of large amounts of N and carbohydrates from the leaves and cotyledons to other portions of the cuttings, principally to the treated hypocotyls. Accompanying this mobilization of materials the treated cuttings responded by rapid swelling of the hypocotyls, profuse root production and a temporary suppression of top growth. Total dry weight of the treated cuttings at the end of the rooting period was slightly less than that of the controls. The responses were proportional to the length of exposure and the conc. of the acid. The possible importance of indoleacetic acid as mobilizer of food materials in various other growth responses is suggested.—N. W. Stuart.

4921. SYRE, HULMUT. Untersuchungen über Statolithenstärke und Wuchsstoff an vorbehandelten Würzeln. Zeitschr. Bot. 33(4): 129-184. 1938.—The geotropic reaction velocity of roots is not connected with the amount of mobile starch in the root cap; its redistribution is not a necessary condition for geotropic response. Roots can respond to gravity when the starch is not re-distributed

according to the direction of the stimulus. Roots in which the statolith starch has been completely removed, by excision of the cap or by treatment with H₂SO₄, may give normal geotropic responses. Vicia faba roots which are ageotropic, as the result of treatment with erythrosin solns, contain the same amount of auxin as normal roots. V. faba seeds on germination give up auxin to the roots. Erythrosin treatment has no effect on this but the roots are quite ageotropic. Erythrosin treatment results in a stimulation of oxidation processes at cut surfaces so that the extraction of growth substances from roots by the Boysen-Jensen agar method then becomes impossible. The different degrees of resistance to oxidation of auxin and heteroauxin, observed by Overbeek (1936), are confirmed. Heteroauxin may enter erythrosin treated roots, either through the epidermis or the cut surface, and bring about growth retardation; auxin is only effective on intact organs, and oxidation processes at cut surfaces destroy it. Raising the oxygen content does not increase the auxin destroying capacity of erythrosin treated roots; complete removal of oxygen hinders it. This hindrance is not observed if the cut surface has first had an opportunity of picking up oxygen so that a redox system appears to be operating. Auxin transport in erythrosin treated roots could not be directly tested. In maize roots treated with erythrosin no transport of heteroauxin occurred though it continued in similarly treated roots of Vicia, Lupinus and Pisum. The loss of geotropic sensitivity in erythrosin-treated roots cannot be explained by alteration of content in growth substances. Moisture differences may play a rôle. Between the perception of the gravitational stimulus and the action of growth substances in bringing about response there must be another link in the chain of causation.—J. H. Priestley.

OSMOSIS, PERMEABILITY

4922. DRAWERT, H., und S. STRUGGER. Zur Frage der Methylenblauspeicherung in Pflanzenzellen. Ber. Deutsch. Bot. Ges. 55(2): 43-54. 1938.—The absorption of methylene blue by the cells of the upper epidermis of onion cells is correlated with the pH of the dye. The walls of resting cells absorb the dye at pH 2 to pH 10; the vacuoles absorb the dye above pH 11. If cells with stained vacuoles are transferred to a buffered solution containing no dye but having a higher pH the dye will move out and be adsorbed by the wall. In growing onions, however, this transition point lies between pH 9 and pH 10. This shifting to the acid side is probably due to the higher content of some dye adsorbing substance in the growing onions. The question whether membranes or vacuoles shall be stained depends upon the dissociation of the dye and upon the presence of a substance in the sap which can store the dye.—H. C. Beeskow.

4923. OSTERHOUT, W. J. V. Potentials in Halicystis as affected by non-electrolytes. *Proc. Nation. Acad. Sci. U. S. A.* 24(2): 75-79. 1938.—To study changes in P.D. caused by diluting the sea water bathing cells of *Halicystis* it is desirable to add a non-electrolyte to maintain the osmotic pressure of the external solution. For this purpose mannite appears to be one of the most suitable. With glycerol, glucose, sucrose and maltose the changes of P.D. are so large that a reversible alteration of the protoplasmic surface is indicated. This may affect the P.D. by changing the partition coefficients of electrolytes or in other ways.— *Auth. summ.*

4924. RUNNSTRÖM, JOHN, und ERIK SPERBER. Zur Kenntnis der Beziehungen zwischen Permeabilität und Stoffwechsel der Hefezelle. Biochem. Zeitschr. 298(5/6): 340-367. 11 fig. 1938.—The rate with which NaF diffused into yeast cells was detd. by studying its interference with respiration and fermentation. Within certain limits the interference was proportional to the fluoride conc. within the cell. Cells of baker's yeast and brewer's yeast were more permeable to fluoride under anaerobic conditions than under aerobic, but with brewer's yeast this difference was less than with baker's yeast. The respiration of baker's yeast was reduced by a short previous treatment with fluoride. By adding cystein it was possible to obtain considerable aerobic fermentation with baker's yeast, and it was found that anaerobic fermentation was more rapidly

decreased by NaF than was aerobic. When the characteristic respiration of yeast was depressed by substrate impoverishment or by previous treatment with thio-glycolic acid, the permeability to fluoride was increased. Upon addition of glucose to yeast suspension the permeability diminished. Several oxidation-reduction systems were without effect. The relation between the metabolism of the cell surface and permeability was discussed.—J. M. Little.

GROWTH, DEVELOPMENT

4925. GALLIGAR, GLADYS C. Temperature effects upon the growth of excised root tips. Plant Physiol. 13(4): 835-844. 1 fig. 1938.—Excised root tips of dent corn, cotton, sunflower and Burpee's Extra Early Pea were grown in a sterile modified Pfeffer's soln. containing dextrose and peptone at 10, 15, 20, 25, and 30° C, respectively, for periods of 14 days. Data on 25 root tips of each sp. indicate that the optimal temp. for excised pea roots was 10° C, for sunflower and corn roots 20° C, and for cotton roots 25° C. Few or no lateral roots developed at 10° and 35° C. Temps. of 25° and 30° C inhibited formation of anthocyanin in corn roots; pigmentation in cotton roots was retarded at 10° and 15° C. Marked distension in diam. occurred in roots of pea at 10° and 25° C and in corn and sunflower roots at 35°.—G. C. Galligar.

VITAMINS

4926. BONNER, JAMES. Nicotinic acid and the growth of isolated pea embryos. Plant Physiol. 13(4): 865-868. 1938.—Pea embryos were isolated from ungerminated pea seeds and grown on synthetic medium, in the dark, under sterile conditions. It is shown, confirming earlier work, that vitamin B₁ added to the medium under these conditions increases the root growth of the embryos, and that the growth of the shoot is also increased. Nicotinic acid added to the medium exerts a similar effect on the growth of the shoot. Vitamin B₁ and nicotinic acid together bring about a larger increase of shoot growth than does either growth factor alone. Nicotinic acid added to the medium for the cultivation of isolated pea roots increases the growth of such roots in the presence of adequate vitamin B₁. The effect of nicotinic acid upon the shoot growth of isolated embryos may then be only indirect and due to the promotive effect of nicotinic acid upon root growth.—J. Bonner. 4927. PAECH, KARL. Die Verteilung der Ascorbinsäure in der Kartoffelknolle. Biochem. Zeitschr. 298(5/6): 307-311. 1938.—The surface of potatoes is much poorer in ascorbic acid than the inside. There is a sharp division in composition and not a gradual increase towards the center of the tuber.—C. S. Robinson.

PHOTOPERIODISM

4928. BORTHWICK, H. A., and M. W. PARKER. Photoperiodic perception in Biloxi soy beans. Bot. Gaz. 100(2): 374-387. I fig. 1938.—When whole plants of Biloxi soy beans are subjected to 8-hour photoperiods, initiation occurs if the intensity of light during the photoperiod is above 100 foot candles. Below 100 foot candles no flower primordia are initiated. When plants are given an 8-hour photoperiod of natural light supplemented by 8 hours of Mazda light, initiation occurs if the intensity of the supplemental light is below 0.5 foot candle, but does not occur if the intensity is above 0.5 foot candle. The stimulus that causes initiation of flower primordia at the growing points arises in the leaves and moves to the growing plants. Flower primordia may be initiated at growing points that are kept either in complete darkness or on photoperiods above the critical, provided the leaves are kept on short photoperiods. Photoperiods shorter than the critical, applied directly to growing points, have no effect on flower bud initiation. Control of initiation is exercised only through application of photo-periods of proper length to the leaves. Whether the responses secured in these exps. are due to a flower-forming hormone or to other causes remains to be determined.

4929. HAMNER, KARL C., and JAMES BONNER. Photoperiodism in relation to hormones as factors in floral initiation and development. Bot. Gaz. 100(2): 388-431. 11 fig. 1938.—Xanthium pennsylvanicum, a cocklebur, was

used as the main experimental object. This is a short day plant and flowers only at day lengths shorter than 15 hours; at day lengths above 16 hours, with accompanying dark periods shorter than 8 hours, it remains vegetative indefinitely. The initial photoperiodic stimulus is perceived by the mature leaves subjected to short photoperiod. The results of this stimulus to floral initiation may be transported to other portions of the same plant which are maintained under conditions of long photoperiod. effect of the initial stimulus can also move across a diffusion junction from a plant subjected to short photoperiod and into a plant subjected to long photoperiod, and bring about the initiation of floral primordia by the latter. Processes resulting in the initiation of floral primordia by Xanthium appear to take place during the dark period, and these processes are affected adversely by small amounts of light, as well as by low temp. It is shown with 2-branched plants that if one branch is subjected to short photoperiod and the other to long photoperiod, both branches will initiate flower buds and flowers will develop provided neither branch is defoliated; if the branch on short photoperiod is defoliated completely neither branch will initiate flower buds, but both may initiate flower buds if the branch on short photoperiod has as much as one-half of one mature leaf. The branch on long photoperiod always initiates flower buds following their initiation on the other branch, whether the former is completely defoliated, has the mature leaves removed, or is undefoliated. However, the branch on long photoperiod never initiates flower buds if its young leaves Development of floral primordia into mature flowers and fruits is also promoted by a substance or substances which are formed in leaves subjected to conditions of short photoperiod and which may diffuse from one plant to another. A portion of a plant which has been continuously subjected to conditions of long photoperiod, but which has been in connection with a portion of the same plant subjected to short photoperiod, may be influenced in such a manner as to behave as though it itself had been photoperiodically induced by direct exposure to short photoperiod. This obtains even after the short day portion has been completely removed. It is shown that the floral initiation substance is not identical with any of the following known growth factors: vitamins B₁, B₂, B₆, pantothenic acid, ascorbic acid, theelin, theelol, inositol, or indoleacetic acid. Authors.

PHOTOSYNTHESIS

4930. FELDBACH, IRMGARD. Über die Kohlensäureassimilation grüner Früchte und einiger grüner Blütenteile. Beih. Bot. Centralbl. Abt. A 58(3): 223-266. 13 fig. 1938.—
Many of the green fruits studied were able, under normal conditions, to assimilate in excess of the compensation point. The relation of assimilation to respiration is all the more favorable the greater the surface of a fruit in proportion to its mass; hence small and flat fruits often assimilate in excess of the compensation point while in large ones the compensation point is as a rule not reached. In green growing fruits of garden pea and grape the true assimilation per unit of area remained quite constant and diminished greatly only in nearly ripe fruits. An increase in assimilation by removal of the leaves could not be determined in fruits of pea and Veronica virginica which on intact plants already assimilated in excess of the compensation point. Under favorable weather conditions many green fruits were able in the course of 24 hours to assimilate with a gain in weight. Entirely by their own assimilatory activity young pea fruits, which on intact plants assimilate in excess of the compensation point, even though retarded, were able to develop further; fruits of Datura stramonium, which do not assimilate in excess of the compensation point, were not able to do so. The fruits of early fruiting trees studied showed only slight assimilation; the fruits of monocotyledonous bulbous plants tested had a large assimilation excess.—Auth. summ. (tr. by H. F. Bergman).

4931. GUT, CH. L'occupation de l'atmosphère. Jour. Forest. Suisse 89(9/10): 195-202; (11): 236-243. 4 fig. 1938.—A study was made to determine the CO: content of the atmosphere at heights of 1, 15, 25, and 35 m. above

the ground in a selection forest of spruce and fir at Couvet, Switzerland. Timber vol. was about 350 cu.m. per ha., and the total quantity of vegetable matter, including branches, foliage, and undergrowth, about 700 cu.m. This occupied a space of 350,000 cu.m. (av. height of stand 35 m.), and contained as much C as normally occurs in 1 billion cu.m. of air, or a column 100 km. high. A selection forest requires 40 yrs. of 100 days growing season to accumulate 700 cu.m. of vegetable matter, hence the C from an air column 25 m. high must be fixed each day. As only about ½ of the C that is introduced into the plant is actually fixed, the CO2 from twice as much air must pass through the leaves. The needle surface was about 165,000 sq.m. per ha., equivalent to 16.5 layers of needles, and a unit of needle surface must assimilate the CO2 in a column of about 40 cm. of air every hour that photosynthesis is going on. Maximum increment depends on full utilization of the growing space by assimilating organs. Observations (June 7) showed that assimilation of CO₂ commenced before 2 a.m., when the temp. was 12.5° C and relative humidity 80% at 1.5 m. above ground inside the forest. Assimilation continued at a moderate rate until 7:30 a.m. (sun rose at 5:00), then proceeded rapidly until 9:30 a.m., after which it slowed down and ceased completely about 2 p.m. By 4:00 p.m. the CO2 content of the atmosphere was again above average (300 p.p.m.). It is concluded that the forest should be managed so as to insure the foliage a maximum of sunlight between 7 and 10 a.m., with humidity at least 80% so that the

stomata will remain open. Dominant crowns should be reasonably isolated.—W. N. Sparhawk.

4932. INMAN, O. L. The Mirsky-Pauling theory of the structure of native, denatured, and coagulated proteins, and some theoretical aspects of the evolution of oxygen from the irradiated green plant. Plant Physiol. 13(4): 859-862. 1938.—The inhibiting action of temp., pH, trypsin, etc. on the evolution of O₂ by irradiated triturates of green leaves indicates a rather close similarity to the denaturation of

proteins.-O. L. Inman.

4933. IRELAND, J. C. Heritable variations in chlorophyll. Phant Physiol. 13(4): 863-865. 1 col. pl. 1938.—A grating spectrograph records the variations of alcoholic extracts of chlorophyll from various grain sorghums. There are characteristic bands in the yellow and red which are apparently inherited.—J. C. Ireland.

4934 JACCARD, P. A propos de l'assimilation du bioxyde de carbone. Jour. Forest. Suisse 90(1): 6-9; (2): 29-35. 1 fig. 1939.—Conclusions of Ch. Gut and others as to the relation of CO2 assimilation to character and intensity of light are discussed. Gut's investigations should be supplemented by studies of the formation of carbohydrates in green leaves during the night, and by studies to ascertain whether the formation of sugar and starch slows down after 9:30-10 a.m. and stops by 2 p.m.—W. N. Sparhawk.

TRANSPIRATION, TRANSLOCATION, WATER RELATIONS

4935. AHI, S. M., and W. L. POWERS. Salt tolerance of plants at various temperatures. *Plant Physiol.* 13(4): 767-789. 3 fig. 1938.—Expts. were undertaken to study temp. and other factors affecting salt tolerance with certain indicator plants. Water culture, soil culture and field plots were included. A constant temp, germinator was employed and chem, detns, were made with soils used.— Temperature is a dominant factor in the germination and growth of plants under saline or alkaline conditions. Straw-berry clover was the most promising resistant legume for saline conditions, followed by sweet clover and then alfalfa. Chem. analyses show marked improvement of treated plats over those of checks with restoration of Ca for Na in the over those of checks with restoration of Ca for Na in the exchange complex, improved reaction, decreased salt conc., higher level of organic matter and N, a tendency to increase base exchange capacity and useful water capacity or moisture equivalent. The crop yields obtained under field conditions substantiate the chemical results. The Soxidizing power of reclaimed soil was greater than that of the virgin alkali soil. Various treatments increased nitrate N—W. L. Powers.

4936. CRAFTS, A. S. Translocation in plants. Plant Physiols 13(4): 791-814. 1938.—Theories to explain rapid

Physiol: 13(4): 791-814. 1938.—Theories to explain rapid

longitudinal movement of foods in phloem fall in 2 classes: (1) movement of solute molecules in, through, or upon the surface of sieve-tube protoplasm, and resulting from its activity; (2) mass flow of soln. through sieve tubes or phloem, related to activity of photosynthetic tissues and not dependent upon activity of sieve-tube protoplasm. The mass flow hypothesis involves a mechanism (Münch's) for transforming concentration gradients into pressure differences. Phloem exudation indicates the existence of such a mechanism in plants. Young sieve tubes have normal parenchyma-type protoplasts. Maturation involves loss of nucleus and change of the protoplast to a thin parietal layer of tough, ductile, elastic, substance, permeable to solutes, not dead, but in a low state of activity. Popularly quoted translocation rates given by Mason and Maskell should be multiplied by factors of from 200 to 500, if the accelerating mechanism is limited to the protoplasm of the sieve tube. Evidence for independent movement of solutes is questioned.—A. S. Crafts.

4937. CURTIS, OTIS F. Wallace and Clum, "leaf temperatures": A critical analysis with additional data. Amer. Jour. Bot. 25(10): 761-771. 1 fig. 1938.—Claims of Amer. Jour. Bot. 25(10): 701-771. Ing. 1935.—Claims of Wallace and Clum [see B. A. 12(2): entry 2603] that transpiration commonly cools leaves by from 6° to 9°C, that a wilted leaf may, by transpiration, be cooled to 7°C below air temp. when in sunlight at midday, and that a vaselined leaf may transpire rapidly enough to cool it to 5°C below air temp., are unsound and based on what is probably faulty technique in measuring air temps. Their claim that the heating and injury of leaves, when coated with a wax, consisting of equal parts of beeswax and rosin, and exposed to strong sunlight, results chiefly from the elimination of the cooling effect of transpiration is unjustified, for evidence is presented showing that hypostomatous leaves, coated on the upper side by the mixture and exposed to strong light, become heated 3-7°C above uncoated leaves given the same exposure, and yet at the same time may be transpiring from 50 to 290% faster than the freely transpiring control leaves. Data are presented showing that vaseline, when applied to single leaves with petioles in vials of water, lowered the transpiration over 3- to 6-hour periods by about 85 to 95%, the wax mixture lowered it by about 90 to 98%, and carnauba wax emulsion lowered it by from 60 to 90%. The leaves coated with vaseline become heated only about 2°C above the freely transpiring control leaves. The excess heating of leaves covered with beeswax

leaves in full sunlight are frequently exposed.—O. F. Curtis. 4938. DIXON, H. H. Subaqueous transpiration. Sci. Proc. Roy. Dublin Soc. 22(5): 55-57. 1938.—Exps. of 1897 were repeated, but leafy branches were allowed to remain in a saturated atmosphere 20-24 hrs. with the cut ends in water to insure against a water-deficit. New surfaces were cut at the ends of the stems and they were transferred to eosin soln. without opening the moist chamber. The eosin rose 17.5 cm. in an hour in some stems. When stems were submerged during the 24-hr. preparatory period and exptl. period significant rises of eosin were observed in all cases where O₂ had not been removed by boiling the water, and sometimes the leaves became thoroughly injected.—H. H.

and rosin mixture was due more to the effect of the wax on relative absorption and loss of radiant energy than to an effect on transpiration. The maximum rates of

transpiration from vaselined leaves were so low that the heat dissipated by this transpiration could account for less than 0.5% of an intensity of incident radiation to which

4939. GROSSENBACHER, KARL A. Diurnal fluctuation in root pressure. Plant Physiol. 13(4): 669-676, 1 fig. 1938.-Plants were grown in soln culture in a greenhouse and measurements of root pressure made with small bore (1 mm.) U-tube manometers. 3 exps. are presented showing some relations between root pressure, respiration and soln. conc. under constant conditions of temp, and light. (Exps. did not show a correlation between respiration and the diurnal fluctuation of root pressure.) There is evidently some force other than osmotic pressure involved in root pressure.-K. A. Grossenbacher.

4940. MÜLLER-STOLL, WOLFGANG R. Wasserhaus-haltsfragen bei Sumpf- und emersen Wasserpflanzen. Ber.

Deutsch. Bot. Ges. 56(9): 355-367. 1938.—Various water relationships of swamp plants are discussed. There is a gradual increase in osmotic pressure during the growing The osmotic pressure also increases during the day due to an increase in non-sugar components. Transpiration in the land plant form of Polygonum amphibium is higher than in the submerged form. Floating leaves of P. amphibium and Nuphar luteum have a higher osmotic pressure than aerial leaves on cloudy days. In Limnan-themum, Nymphaea alba, and P. amphibium the floating leaves have a lower osmotic pressure than the aerial leaves on sunny days. Swamp plants growing in very wet soil have a somewhat higher osmotic pressure than those growing in drier soils. Transpiration is regularly higher in those plants growing in wet soils.—H. C. Beeskow.

4941. TAGAWA, T. Further studies on the influence of the water temperature on the water absorption and the stomatal aperture. Jour. Fac. Agric. Hokkaido Imp. Univ.

45(1): 1-33. 1938.

RADIATION EFFECTS

4942. NICOLAS, G. Sur la persistance du feuillage vert chez le Plantane après la période de chute normale. Bull. Soc. Bot. France 85(5/6): 307-309. 1938.—At the end of Dec. 1937, a branch of a plane tree, and some young plane trees had retained their green leaves although the normal leaf fall had occurred more than a month earlier. The author attributes this behavior to the proximity of the branch and the trees to some incandescent lamps, the infrared radiation of which, preventing the nocturnal cooling, had not permitted hydrolysis of starch with its attendant consequences.-P. D. Strausbaugh.

RESPIRATION

4943. NELSON, R. C. Physiology of ethylene production, use, and reactions in plants. Proc. Minnesota Acad. Sci. 6: 37-41. 2 fig. 1938(1939).—The author studied the production of ethylene by apples and bananas. The methods used are outlined. He found an inverse relationship between ethylene production and keeping quality of apple vars. in storage. It appears that ethylene is concerned with the respiratory processes, being produced by them and perhaps

acting as a regulator of them.—H. K. Wilson.
4944. PETRIE, A. H. K., and R. F. WILLIAMS. Physiological ontogeny in plants and its relation to nutrition. 5. The effect of nitrogen and phosphorus supplies on the respiration rate of the leaves. Australian Jour. Exp. Biol. and Med. Sci. 16(4): 347-360. 4 fig. 1938.—An account is given of the temporal drift in respiration rate of the total leaves in 2 of the expts. described in previous papers. In one of these expts. Sudan grass (Andropogon sudanensis) was grown with varying N treatments, and in the other oats were grown with varying P treatments. On a dry weight basis the respiration rate had an early maximum, after which it declined continuously with time. Increasing N treatment caused a general increase in rate. Up to a point increased P treatment caused an increase in rate during the early growing period; but this effect was subsequently reversed, just as was previously found in the case of protein-N content. Analysis of the data indicated that not only the decline in respiration rate with time, but also the treatment effects thereon, are largely the result of variations in the cytoplasm content of the leaves; and that in data such as the present, the content of cytoplasm is probably roughly measured by the protein content of the leaves. There is evidence, however, that other factors, possibly including conc. of respiratory substrates, influenced the respiration rates observed.—A. H. K. Petrie.

NITROGEN METABOLISM

4945. BONIS, E. de. Contributo alla conoscenza delle sostanze azotate della foglia di tabacco durante l'accrescimento della pianta. [Nitrogenous substances of tobacco leaf in growing plants.] [With Eng. summ.] Boll. Tecn. R. Ist. Sper. Tabacchi Scafati 35(2): 78-85. 1938.

HARDINESS

4946. STUCKEY, IRENE H., and OTIS F. CURTIS. Ice formation and the death of plant cells by freezing. Plant

Physiol. 13(4): 815-833. 1938.—A technique is described for direct microscopical observation of ice formation in living cells. The material examined included stamen hair cells of Zebrina pendula, prothallia of Polypodium aureum, epidermis of red cabbage, and leaves and seeds of wheat. As the temp. was lowered streaming of the protoplasm in the stamen hair cells became slower and gradually ceased. In some cases, Brownian movement was visible for a few seconds after streaming had stopped. Formation of ice occurred first at -7 to -8°C in the basal cells and quickly extended to the tip. The ice crystals were granular and compact. Similar granular ice was formed in most cases in the fern prothallia but occasionally needle-like crystals occurred. The order of freezing seemed to agree with the The order of freezing seemed to agree with the theoretical consideration; ice was formed first in the cytotheoretical consideration; ice was rounced may be plastided. The plasm, then in the vacuole and lastly in the plastide. The changes in the nucleus could not be determined. With thawing, the surface membrane was found to have lost its semipermeable character, allowing droplets of cell sap to collect in the mounting fluid; the cytoplasm became granular and disintegrated; the nucleus assumed a glassy appearance. Sucrose solns, had no protective action in preventing killing of red cabbage cells during thawing if ice had been formed within the protoplast. With wheat collective metric and the protoplast is a contracted of varying water contracts there were also a provide light. seeds of varying water contents, there was a close parallelism between the water content of the seed, temp. at which ice formation was observed in the embryo, and their germi-nation after being exposed to temps. below freezing. There was also a close correlation between ice formation and was also a close correlation between ice formation and killing by low temps, in leaves of hardened and non-hardened Minhardi wheat plants. The evidence presented strongly suggests that death of plant tissues at low temps, is the result of mechanical injury resulting from ice formation within the cells and that anything which will decrease the possibilities of ice formation within the cytoplasm will thus increase the resistance of the cell to freezing temp—I H Stacker freezing temp.—I. H. Stuckey.

PIGMENTS

4947. BECK, WILLIAM A. Effect of sun and shade on pigment development. Plant Physiol. 13(4): 871-872. 1938. -A study of the relative amounts of water, chlorophyll, xanthophyll and carotene contained in plantain, showed that sun favors water storage and xanthophyll production, while shade favors chlorophyll and carotene production. W. A. Beck.

ENZYMES

4948. ADAMS, M. H., and J. M. NELSON. On the nature of the enzyme tyrosinase. Jour. Amer. Chem. Soc. 60: 2474-2478. 1938.—In tyrosinase preps. from the common mushroom (Psalliota campestris), the activity toward catechol and p-cresol were mutually independent and could be varied by adsorption of the enzymes to alumina and kaolin. Attempts to affect the ratio of the catechol and p-cresol activities of tyrosinase preps from Lactarius piperatus and the puff ball (Calvatia cyathiformis) were unsuccessful.- $H.\ N.\ Glassman.$

4949. BALLS, A. K. Some modern aspects of enzyme catalysis. Jour. Washington Acad. Sci. 28(10): 425-433. 1 fig. 1938.—An address on some of the more recent discoveries as to the constitution and mode of action of enzymes, with reference to their application in the enzyme laboratory of the Food Research Division of the Dept. of Agric.—A. K. Balls.

4950. KURSÄNOV, A., i N. KRŪKOVÄ. Sinteziruūshchěé ï gïdrolïzuüshchěé děistvïé fosfatäz v zhïvykh tkänſakh vysshïkh rastenĭi. [The synthesizing and hydrolyzing action of phosphatases in the living tissues of higher plants.] [In Russ. with Eng. summ.] Biokhimiia [Biochem.] 3(4): 529-540. 1938.—To study synthesizing phosphatase action, living plants were infiltrated with 0.058 M Na₂HPO₄ soln. The hydrolyzing activity of phytase, glycerophosphatase, hexosemonophosphatase and hexosediphosphatase was detd. by infiltration with solns, of their respective esters. Chickory leaves had the highest synthesizing phosphatase action, lupine sprouts the lowest. In all plants tested, phytase exhibited the highest rate of hydrolysis.—E. K. Johnson. under glass cages without becoming rusted; the other set, planted in autumn, was infested at the normal season with all 3 rusts.-F. M. Blodgett.

4963. GOTO, K. Sclerotium rolfsii Sacc. in perfect stage. V. Inoculation studies with natural strains, basidiospores, single basidiospore isolates, and some F_{1-} , F_{2-} and back cross strains obtained by mating. Ann. Phytopath. Soc. Japan 7(3/4): 203-220. Illus. 1938.

4964. HIRAI, TOKUZO. Studies on the Sclerotium disease of bananas. [In Jap. with Eng. summ.] Ann. Phytopath. Soc. Japan 8(3): 212-229. 2 fig. 1938.—The writer isolated Corticium centrifugum from affected bananas, white clover, rocamboles, carrots, burdocks and sugar beets, and carried out comparative studies on the morphology, cultural characters and aversion phenomena among these strains. Of the banana strain further studies on the pathogenicity to bananas, some physiol. characters and the control measures were carried out. Under favorable conditions either the hyphae or the sclerotia on the fungus could affect healthy banana fruits. The sclerotia germinated at 24°-36°C and at 97% of relative air humidity. Mycelial growth was vigorous at 28°-32°C, diminished remarkably at 20° and was scarce at 11°C.—Y. Tochinai.

4965. MILBRATH, J. A. Berckman blight. Oregon Sta. Circ. Inform. 186. 1-3. 1938.—Coryneum sp. is shown to be the cause of this blight of Thuja orientalis and its vars.,

which has proved destructive in Oregon nurseries and home gardens.—F. V. Rand (courtesy Exp. Sta. Rec.).

4966. TAKIMOTO, S. [The diseases of crops due to Phytophthora sp.] [In Jap.] Ann. Phytopath. Soc. Japan 7(3/4): 240-248. Illus. 1938.

4967. WAGENER, WILLIS W. The canker of Cupressus induced by Coryneum cardinale n. sp. Jour. Agric. Res. 58 (1): 1-46. 8 fig. 1939.—Resinous lesions are produced in the bark of twigs, branches and trunks of host trees, resulting in ultimate girdling. Principal hosts are Cupressus macrocarpa and C. sempervirens stricta; isolated cases of natural infection have also been found on C. pygmaea, C. forbesii, C. lusitanica, Thuja orientalis, Chamaecyparis lawsoniana, Libocedrus decurrens, Juniperus chinensis femina and J. sabina (tamariscifolia?). In California the disease is epidemic on planted cypresses, with an estimated disease is epidemic on planted typicses, with an estimated loss of 30,000 trees, but has not yet been found in the restricted native groves of *Cupressus*. It also occurs on North Island, New Zealand. Trees of any size or age may be attacked. The causal fungus is *Coryneum* cardinale. An unnamed saprophytic Coryneum with nearly identical spores also occurs on Cupressus macrocarpa in cool, coastal districts. The 2 fungi show no aversion in culture but the saprophyte grows more slowly. On agar plates at constant temps. optimum growth for the parasite occurred at 26°C and at 18° for the saprophyte, with no growth at 35° and 30° respectively. The minimum temp. for both was slightly under 6°. Exposure of the parasitic fungus to low temps. slightly depressed following growth at favorable temps. Length extension of cankers averaged 20 cm per year at an inland station and 10 cm. at a cool, coastal station. Spore production in nature is governed chiefly by humidity. In dry storage spores remained viable as long as 42 months. Dissemination is chiefly by natural means, but has also occurred on nursery stock and locally on pruning tools. Coated slides and plates exposed to wind yielded few spores but up to 228 per sq. cm. were caught on filter paper under cankers during rains. Field evidence indicates that infection may occur with or without wounds but exptl. infection without wounding was inconclusive. Inoculations indicated susceptibility to be pronounced for Cupressus macrocarpa, moderately high for C. sempervirens indica and Juniperus virginiana, medium for C. lusitanica, C. arizonica and C. macnabiana, and slight or none for Thuja occidentalis, Juniperus occidentalis, Cryptomeria japonica and Libocedrus decurrens. Establishment of the disease probably occurred in California as early as 1915. Proof of origin is lacking. Prevention of establishment in new districts is the most promising means of control.—W. W. Wagener.

DISEASES CAUSED BY BACTERIA

4968. BURKHOLDER, WALTER H. The occurrence in the United States of the tuber ring rot and wilt of the potato (Phytomonas sepedonica) (Spickermann u. Kotthoff) Bergey et al. Amer. Potato Jour. 15(9): 243-245. 1938.—In potatoes from Florida and Maine.

4969. MATSUMOTO, T., and Y. HUZIOKA. Bacterio-phage in relation to Bacterium malvacearum E.F.S. I. Ann. Phytopath. Soc. Japan 7(3/4): 193-202. Illus. 1938.

4970. MUSHIN, ROSE. Studies in the physiology of plant pathogenic bacteria. Australian Jour. Exp. Biol. and Med. Sci. 16(4): 323-329. 1938.—A comparative study has been made of a xylem invader, Bacterium solanacearum, and a phloem invader. Aplanobacter michiganense, by supplying compounds, which are likely to be found in the xylem and phloem of host plants. No reason is apparent why both organisms should be restricted to the vascular tissues. The organisms were isolated in Victoria and some

of their morphological and cultural characters show differential features.—R. Mushin.

4971. OKABE, NORIO. Bacteriophage in relation to Bacterium malvacearum. II. Relation between variants and phage. [In Jap. with Eng. summ.] Ann. Phytopath. Soc. Japan 8(3): 230-246. 1 pl., 1 fig. 1938.—32 colony variants were obtained from 2 strains of Bact. malvacearum isolated from the angular spots of cotton in Formosa: 9 variants were from one culture strain and 23 variants from another. All the variants derived from the former are resistant to the phage which was isolated from the diseased leaves; all of the latter are susceptible to it, though they differ in susceptibility and in size of plaque produced, more susceptible variants generally producing larger plaques. The plaques produced on the cultures of certain 3 variants enlarge to a great extent with the increase of the incubation period. The phage in question consists of at least 2 elemental phages, one active against all the variants, the other inactive against 5 of the variants. The size and number of plaques decrease with increase of the amount of bacteria used. The same is true with the temp. within certain limits, although in this case the effect is more pronounced on the number of plaques. Resistant strains developed from the phage-bacterial cultures are not visibly different in morphological characters from their original susceptible bacteria. Y. Tochinai.

4972. UPPAL, B. N., M. K. PATEL, and M. N. KAMAT. Bacterial leaf spot of soybean in Bombay. Jour. Univ. Bombay 6(5): 16-18. 1938.—An organism was isolated which has the morphology and biochemical properties and cultural reatures of Phytomonas phaseoli sojense. Infection of 17 vars. was readily obtained by inoculation, but Pisum sativum, Lathyrus sativus, Cajanus indicus, Cicer arietinum, Phaseolus mungo, P. radiatus, Vigna catjang, and Medicago sativa did not contract the disease.—W. D. Pierce.

DISEASES CAUSED BY ANIMAL PARASITES

4973. GOFFART, H. Zur Lebensgeschichte von Heterodera schachtii maior (Nematodes). Zentralbl. Bakt. II. Abt. 99(18/23): 394-399. 1939.—Observations on the life history of the oat nematode showed that the underdeveloped forms ("Kümmerformen") are present even in early stages of larval development. These may emerge from the cysts, but only the larger ("major") forms are able to penetrate the plant roots. However only a portion of the latter are capable of further development and reproduction. No difference was noted in the development of the oat nematode in different host plants. The full development of larvae requires 9 months. Warming the soil causes the larvae to emerge from the cysts. Apart from the host plant certain larvae have been found capable of existing in soil for at least 6 months.—A. G. Lochhead.

VIRUS DISEASES

4974. BAWDEN, F. C., and N. W. PIRIE. Crystalline preparations of tomato bushy stunt virus. Brit. Jour. Exp. Path. 19(4): 251-263. 1938.—A protein, probably the virus itself, has been isolated from infected plants. It is fully crystalline not liquid crystalline. Its particles are apparently spherical not elongated like other virus particles. I cc. of 10⁻⁷ gm. soln. produces infections and 1 cc. containing 10⁻⁶ gm. gives a specific precipitate with antiserum. When precipitated with salts this virus forms true crystals, mainly rhombic dodecahedra (photographs). It is a nucleoprotein. Full descriptions are given of methods, serological reactions

and infectivity, analyses and isolation of nucleic acid, and the effects of acids, alkalis and ultra-violet light. The the effects of acids, alkalis and ultra-violet light. results appear to give added proof that the proteins are the viruses themselves because the authors have strong claims for the purity of their fully crystalline, homogenous preparations. 20 references.—J. B. Paton.

4975. BAWDEN, F. C., and N. W. PIRIE. A note on some protein constituents of normal tobacco and tomato leaves. Brit. Jour. Exp. Path. 19(4): 264-267. 1938.—The heat stable proteins were described by the authors in 1937 (Proc. Roy. Soc. B, 123, 274, 1938). This paper deals only with the unstable proteins which must be removed in the isolation of the viruses. The proteins of the viruses already isolated differ definitely and cannot be confused with these normal proteins, but some unstable insect-transmitted viruses do resemble them and hence are more difficult to isolate. These unstable proteins are soluble, have large molecules and are readily sedimented from neutral soln. by long, high-speed centrifuging (2 hours at 12,500 r.p.m. in a rotor 8 cm. radius). The sediment is a brown jelly. At room temp. these proteins denature and precipitate in a few days but are fairly stable in the cold. Freezing converts them irreversibly into insoluble material while some virus proteins are unaffected by freezing. Except for their high mol. wt. these normal plant proteins have little in common with the plant viruses which have been isolated. There is a larger amount of protein in clarified sap from infected plants than from normal. There is no change in total protein content of infected leaves comparable with change in soluble proteins. The yield of unstable proteins in normal or infective sap is about 2 gm. per liter and this amount of virus can be obtained from 1 liter of infective sap. This suggests that infection may change the ratio of soluble to insoluble protein and that a detailed study of normal nucleoproteins might explain how abnormal nucleoproteins are formed in infected plants.—J. B. Paton.

4976. BERNAL, J. D., I. FANKUCHEN, and D. P. RILEY. Structure of the crystals of tomato bushy stunt virus preparations. Nature [London] 142(3607): 1075. 1938.—
Data obtained from X-ray examination are reported. A particle size of 340 Å diam. and a mol. wt. of 24,000,000 for the wet particle of density 1.286 are indicated.—E. Oyler.

4977. KAWAMURA, T. So-called virus diseases of lily in relation to hosts. Ann. Phytopath. Soc. Japan 7(3/4): 163-172. 2 pl., Illus. 1938.

4978. OCFEMIA, G. O., and MARTIN S. CELINO. Transmission of abaca mosaic. *Philippine Agric*. 27(7): 593-598. 2 fig. 1938.—Aphis gossypii and 2 other spp. of aphids are important agents in the transmission of the disease.—M.

4979. STOREY, H. H., and R. F. W. NICHOLS. Virus diseases of East African plants. VII. A field experiment in the transmission of cassava mosaic. East African Agric.

Jour. 3(6): 446-449. 1938.

4980. TOMPKINS, C. M., M. W. GARDNER, and H. REX THOMAS. Black ring, a virus disease of cabbage and other crucifers. Jour. Agric. Res. 57(12): 929-943. 6 fig. 1938.-The disease occurs chiefly in the cool, coastal valleys of California during the winter and is uncommon in the summer. It damages the older, outer leaves. The symptoms-chlorotic lesions, many of which become partially or entirely necrotic with age—are most conspicuous on the under surface of the leaf. In the greenhouse, the virus has been transmitted to healthy cabbage plants by the cabbage aphid, *Brevicoryne brassicae*, and the green peach aphid, *Myzus persicae*. It is also readily transmissible by juice inoculations with powdered carborundum. The inactivation temp. lies between 57° and 59° C. It withstands aging in vitro at 22° C for 48 hours, and has a tolerance to dilution of 1 to 700. All tested vars of cabbage proved susceptible. In the Cruciferae, systemic infection was obtained on kale, Brussels sprouts, sprouting broccoli, kohlrabi, turnip, pe-tsai, charlock, dame's violet, cauliflower, rape, rutabaga, leaf or Chinese mustard, white mustard, Brassica adpressa, shepherd's purse, wallflower, Brompton stock, water cress, Chinese radish, evening scented stock, annual stock, and honesty. Infection was also obtained on plants representing 11 additional families, as follows: Rhubarb, lambs' quarters, sowbane, spinach, chickweed, mignonette, fibrous-rooted begonia, garden verbena, petunia, Iceland poppy. Nicotiana glutinosa, N. langsdorffii, N. tabacum, mourning bride (Scabiosa atropurpurea), annual marguerite (Chrysanthemum coronarium), Zinnia elegans, Dimorphotheca aurantiaca, cineraria (Senecio cruentus), and

Myosotis alpestris.—Authors.

4981. TOMPKINS, C. M. Two mosaic diseases of annual stock. Jour. Agric. Res. 58(1): 63-77. 7 fig. 1939.—Two mosaic virus diseases of annual stock (Matthiola incana var. annua), designated as mild mosaic and severe mosaic. are described. These diseases are prevalent in the cool, coastal valleys of California and cause considerable loss in the cut-flower and seed crops. The principal symptoms, common to both diseases, consist of leaf mottling and flower breaking. Severe mosaic shows more conspicuous symptoms. These viruses are readily transmissible by juice inoculations with carborundum. In nature, transmission is by means of the turnip or false cabbage aphid (*Lipaphis pseudobrassicae*) which breeds on annual stock. Tests for seed transmission yielded negative results. All self-colored vars. of annual stock are highly susceptible to infection, as indicated by leaf mottling and flower breaking. Mottling occurred on white- and yellow-flowered vars., but no flower breaking. Hosts which are susceptible to infection with both the mild and severe mosaic viruses of annual stock include turnip (Brassica rapa), black mustard (B. nigra), white mustard (B. alba), dame's violet (Hesperis matronalis), evening scented stock (M. bicornis), charlock (B. arvensis), shepherd's-purse, mignonette (Reseda odorata), and Turkish and White Burley tobacco. The fact that no infection of cabbage, cauliflower, kale, Brussels sprouts, sprouting broccoli, kohlrabi, rape, or rutabaga was obtained with the 2 mosaic viruses of annual stock serves to differentiate them from certain other crucifer viruses. Differential hosts serve as one means of differentiating the 2 mosaic viruses of annual stock. Susceptible to infection with the mild mosaic virus only are Chinese or leaf mustard (B. juncea), pe-tsai (B. pe-tsai), radish, Chinese radish (B. sativus var. longipinnatus), Virginian stock (Malcomia maritima), honesty (Lunaria annua), sweet alyssum (Alyssum maritimum), wallflower (Cheiranthus cheiri), Brassica adpressa, sowbane or nettleleaf goosefoot (Chenopodium murale), Nicotiana glutinosa, and N. langsdorffii. Infection of lambs' quarters (S. album), spinania, and petunia was obtained only with the severe mosaic virus. The mild mosaic virus was infectious for 5 days after storage at 22° C, the severe mosaic virus for 7 days. The inactivation temp. for each virus lies between 58° and 60°. The mild mosaic virus caused infection when diluted up to 1:4,000 and the severe mosaic virus up to 1:3,000. Flower breaking of annual stock may also be induced by the Chinese cabbage, turnip, horseradish, and cabbage mosaic viruses and the cabbage black-ring virus.—C. M. Tompkins.

4982. VARADARAJA IYENGAR, A. V. Contributions to

the study of spike disease in sandal (Santalum album, Linn.). XIX. Physiological and physical methods of characterising the disease. Jour. Indian Inst. Sci. 21A(8): 89-101. 5 fig. 1938.—Diseased plants may be differentiated from healthy by the low C/N ratio of the former which is generally below 0.3. The ratio for the healthy plants is above 0.7. The ratio N/ash varies with the stage of the disease and can not be used for diagnosis. The disease can be diagnosed biometrically from the ratio of leaf length to leaf width, which is less than 2.5 in healthy leaves and greater than 3.5 in spiked leaves. The leaf stalk is significantly shorter on diseased plants and the internodes have a relatively uniform length in contrast to the internodes of healthy plants which become increasingly longer from the tip to the base of the branches.—C. H. Arndt.

NON-PARASITIC DISEASES

4983. BURRELL, A. B. Does your orchard need boron? Amer. Fruit Grower 58(11): 5, 16, 19. 4 pl. 1938.—The symptoms of B deficiency are differentiated from other fruit spots such as internal cork, external cork and fruit spot or stippen. Severe die-back and rosette are marked on soils deficient in B; recovery ensued on application of B. Fruit characteristics are abnormal coloration, pebbly to the touch, and in McIntosh, early fruit dropping. This condi-

tion does not increase in storage as is the case of other spotting (e.g., "Baldwin spot"). Fall or spring applications are effective and a table of dosage based on tree age is

given .- H. A. Cardinell.

4984. CALINISAN, MELANIO R. Vascular disease of abaca (Manila hemp) in Davao. Philippine Jour. Agric. 9(2): 153-160. 11 pl. 1938.—The disease has apparently increased in extent and severity since its first recognition about 1932. Symptoms resemble those of wilt (Fusarium cubense) of banana. Isolations revealed the presence of this fungus together with numerous bacteria (unidentified), and tunnels of a stem weevil (Odoiporus) are also present. Inoculation studies with the 3 types of organisms are in

4985. MARTIN, J. P. Stem galls of sugar cane induced with an insect extract. Hawaiian Planters' Rec. 42(2): 129-134. 5 fig. 1938.—The author reports 3 tests in which stem galls were induced by inoculation with an extract prepared by macerating green leafhoppers (Draeculacephala mollipes) with a small amount of distilled water. These outgrowths appeared only when the inoculation was made in tissue capable of making further growth.—F. V. Rand (courtesy

Exp. Sta. Rec.).

4986. VEEN, R. van der. Tjemara-Ziekte (frenching) bij tabak als vergiftigingsverschijnsel. [Frenching in tobacco as a toxicity phenomenon.] [With Eng. summ.] Meded. Besoekisch Proefstat. 61: 14-20. 3 pl. 1938.

PARASITISM AND RESISTANCE

4987. BABB, M. F., and J. E. KRAUS. Tolerance of certain potato varieties to psyllid yellows. Nebraska Potato Impr. Assoc. Ann. Rept. 18: 26-30. 1937.—In a test conducted at Cheyenne, Wyoming, none of the 39 vars. of potatoes proved immune to psyllid yellows. This was confirmed by a planting immediately adjacent to the test plats in which about 182 vars. were grown. However, there appear to be inherent differences between vars. in their tolerance of the disease. Data are presented to show the effects of infection on tops and tubers, and on the relation between yield and earliness to psyllid injury.—Courtesy Exp. Sta. Rec.

4988. DOORENBOS, S. G. A. Kruisingsproeven met iepen te 's-Gravenhage. [Experiments on elm-crossing at the Hague.] Tijdschr. Plantenziekten 44(3): 161-164. 1938. The exps. started by Buisman were continued after her The technique of crossing as influenced by the prevailing weather is descr. Different crosses were made e.g., Ulmus hollandica × U. pumila var. pinnato-ramosa and U. hollandica × U. foliacea dampieri. The resistance of the hybrid seedlings is under investigation.—H. L. G. de Bruyn. 4989. GREATHOUSE, GLENN A., and G. M. WATKINS.

Berberine as a factor in the resistance of Mahonia trifoliolata and M. swaseyi to Phymatotrichum root rot. Amer. Jour. Bot. 25(10): 743-748. 10 fig. 1938.—The alkaloid, berberine, is shown to be present in roots of M. trifoliolata in concs. varying from 1.33 to 2.25% and in roots of M. swaseyi in concs. ranging from 2.15 to 2.48% on the dry weight basis. The lowest of these concs. is more than 65 times that shown experimentally to prevent growth of P. omnivorum. The conc. of berberine is lower in the aboveground parts of the plant, ranging from 0.45% in the older stems to none in the young leaves. Sections of fresh roots of these spp. were treated microchemically to crystallize berberine in situ, and the distribution of the alkaloid in the various tissues was studied microscopically. Berberine was found widely distributed in walls of tracheids and vessels in the xylem and in smaller amts. in lumina of cells in the wood rays. In extracambial tissues it occurs in a continuous zone surrounding the active phloem. The bast fibers are impregnated with berberine, and small amts. are frequently observed in the periderm. The generally continuous zone of berberine-containing parenchymatous cells, which surrounds the root just beneath the periderm, is a possible factor in the resistance of M. t. and M. s. to

Phymatotrichum root rot.—G. M. Watkins.

4990. HAERINGEN, G. H. van. Eenige waarnemingen in de praktijk over Phytophthora erythroseptica. [Practical observations on P. erythroseptica.] Tijdschr. Plantenziekten 44(5): 247-256. 1938.—The attack takes place in the period

of dying-off of the foliage and stolons of the potato. Observations made over a 10-yr. period proved that the most severe attack occurs during dry, hot summers. The disease occurs on different types of soil, especially on poorly drained peat. High soil temp. (22°C) favors attack; low soil temp. during the ripening period of the tubers prevents spread of the disease. As a control measure the author recommends the use of potato vars with strongly developed leaves as well as all means favoring development of the foliage; this keeps the soil cool; also, amendment of soil structure for the same purpose, and deep drainage during winter.

H. L. G. de Bruyn.

4991. IMURA, JUNZO. On the influence of sunlight upon the lesion enlargement of the Helminthosporium disease of rice seedlings. [In Jap. with Eng. summ.] Ann. Phytopath. Soc. Japan 8(3): 203-211. 1938.—Rice seedlings inoculated artificially with H. oryzae (Ophiobolus miyabeanus Ito et Kuribayashi) were kept in glass boxes and wire cages which were covered with a single sheet or with double sheets of white cotton cloth, or with double sheets of black cloth. The controls were raised in similar boxes and cages without covering. The exps. were carried out in a green-house. The seedlings were cut after certain intervals (5-20 days), and the sizes of the lesions were measured. The enlargement of the lesions in early stage of the exp. (5 days) was the most conspicuous on the plants kept in the dark (by intercepting sunlight with double sheets of black cloth); it was slowest on the control plants. In advanced stages (10-15 days, and 20 days), the most constitutions of the latest of the spicuous enlargement of the lesions occurred on the plants covered with double sheets of cotton cloth, and over half of the plants covered with black cloth were killed. On artificial culture media growth of the fungus was retarded by sunlight .- Y. Tochinai.

4992. JEWETT, FRANCES LOUISE. Relation of soil temperature and nutrition to the resistance of tobacco to Thielavia basicola. Bot. Gaz. 100(2): 276-297. 37 fig. 1938.— Five vars. of tobacco of different degrees of susceptibility to T. basicola were grown in sand in constant temp. tanks at 18-20° and 28-30°C. At each temp, half of the plants were given +N (nitrate N) nutrient soln, and half -N soln. For each condition some of the plants were inoculated with T. basicola and some kept uninoculated as controls. Roots and stem bases of some controls were wounded by pricking. The change in N nutrition did not alter the relative susceptibilities of the 5 vars at high or low temps. High temps, decreased, low temps, increased, the amount of infection in both +N and -N plants. Microscopic examination of roots revealed no relation between peripheral periderm formation in controls, and degree of resistance. There was no evidence of the formation of a periderm in advance of the fungus or around fungal lesions. Response to fungal injury was similar to the reaction to mechanical injuries. Resistance to *Thielavia* under certain environmental conditions was apparently not detd. by anatomical modifications in the root and crown.-F. L. Jewett.

4993. KOSTOFF, DONTCHO. Triticum timococcum, the most immune wheat experimentally produced. Chron. Bot. 4(3): 213-214. 1938.—An amphidiploid strain of wheat (T. timopheevi-monococcum, n=21, 2n=42) produced by the author and called by him T. timococcum was grown during 1937 among a world collection of wheat, most of which was severely attacked by various rusts, bunt, mildew, etc. showed complete immunity against all diseases. Artificial infections with various rusts were unsuccessful. The kernels, larger than those of the parent species, weighed 44.5 g per thousand. Since it appears to be the most immune wheat known, it is the most promising form for breeding immune wheats.—H. P. Barss (courtesy of Exp. Sta. Rec.)

4994. SEMPIO, C. Su un caso sperimentale di netto antagonismo in vivo (Tilletia caries, Erysiphe graminis su Mentana). [An experimental case of clear antagonism in vivo (T. caries, E. graminis on Mentana).] Riv. Patol. Veg. 28(9/10): 377-384. 1 fig. 1938.—Wheat growing in pots, half planted with grain infected with T. caries, was inoculated with conidia of E. graminis. The mildew developed much more strongly on the wheat in pots planted with healthy seed than on those planted with smutted seed.—F. M. Blodgett,

4995. SEMPIO, C. Sulla maggiore sensibilita di piante infette al momento della sporificazione del parassita. [The greater sensitiveness of infected plants at the time of sporulation of the parasite.] Riv. Patol. Veg. 28(9/10): 398-397. 2 fig. 1938.—When lettuce plants inoculated with Bremia lactucae were held in darkness from the 7th to 9th day after inoculation the fungus fruited sparsely and many of the leaves were flaccid or necrotic. In contrast to these, the fungus fruited normally on plants held continuously in normal daylight, or those kept in darkness for the

first 6 days after inoculation.—F. M. Blodgett.

4996. THARP, W. H., and V. H. YOUNG. Relation of soil moisture to Fusarium wilt of cotton. Jour. Agric. Res. 58(1): 47-61. 1 fig. 1939.—The effect of relative soil moisture content on the Fusarium wilt of cotton has been studied under greenhouse conditions, using a susceptible var. (Harper Mebane) in all tests and the resistant Rhyne Cook in 1 expt. The soil used was a silt loam; high in available N and phosphate, low in available potash (obtained from a field where both wilt and potash hunger were severe in previous years), with a pH value of 6.52 and a water holding capacity of 37.7% of the oven dry weight. Soil moisture levels of 20 to 100% of saturation were used in 3 tests at prevailing greenhouse air temps. (records are shown) and at each of the following constantly maintained soil temps.: 23°, 26°, 29°, and 32° C. In all tests the susceptible cotton var. showed a positive disease correlation with rise in moisture level to an optimum at 80 to 90% of saturation and a negative correlation with the increase to 100% of the water holding capacity of the soil. There was little correlation of plants actually wilted with soil moisture level for the resistant Rhyne Cook variety. When total infection was measured it was found that there was exhibited an irregular disease increase with rise in soil moisture over the entire range of moistures employed. The pH value of the inoculated soil at the different moisture levels was found to have been readjusted until at termination of 2 expts. it exhibited a positive correlation with the moisture content of the soil. In both tests the moisture level producing the highest disease had caused little readjustment from the original pH of 6.52. The data obtained at the 4 constant soil temps. indicate the possibility of an interrelated influence of soil moisture and soil temp. on the disease. The correlative change in pH with increase in soil moisture indicates that there may be other interrelated effects of different phases of the disease environment.— W. H. Tharp.

4997. Van LUIJK, A. Antagonism of Penicillium spec. versus Pythium debaryanum. Chron. Bot. 4(3): 210-211. 1938.—Complete inhibition of P. debaryanum attack on alfalfa seedlings was obtained by adding to the soil culture fluid in which *Penicillium* sp. had grown. The thermostable toxic substance was produced most strongly with maltose as C source. Saccharose was also satisfactory; lactose was not. A culture with 4% saccharose was toxic to Pythium up to 1 part in 1,280, equaling 0.2% HgCl₂ toward this fungus. The possibility is mentioned of using these toxins for disinfecting soil in pot cultures.—H. P. Barss (courtesy of Erro Sta Par)

of Exp. Sta. Rec.).

4998. WENT, J. C. Verslag van de onderzoekingen over de iepenziekte, verricht op het phytopathologisch laboratorium "Willie Commelin Scholten" te Baarn, gedurende
1937. [Report on the elm disease investigations, conducted
in the "Willie Commelin Scholten" Phytopathological
Laboratory at Baarn during 1937.] Tijdschr. Plantenziekten 44(3): 141-154. 1938.—A large number of elm seedlings were tested for susceptibility to Ceratostomella ulmi. Some of these were unknown as to parentage, others were from known crosses. Trees selected for resistance in previous years were reinoculated. On tree No. 24, now known as elm "Christine Buisman," 220 inoculations were made, and in only 4 cases was a slight attack observed. Since 1932 this tree and its offspring have been inoculated 732 times; in 13 cases disease symptoms were observed, in 24 a slight attack was found, but all the affected trees continued growth and no permanent damage resulted. Similar results were obtained in other countries. Ulmus wallichiana, U. wilsoniana and U. macrocarpa were shown to be susceptible. Inoculations by means of bark beetles were compared with

those by injection of spores; both methods gave comparable results.-H. L. G. de Bruyn.

DISEASE CONTROL

4999. ANDERSON, P. J. Control of downy mildew achieved in New England. Tobacco 106(26): 12-14. 5 fig. 1938.—The benzol and paradichlorobenzene methods of control for tobacco blue mold or downy mildew succeeded in Connecticut.—F. V. Rand (courtesy of Exp. Sta. Rec.).

5000. BLISS, DONALD E. Spoilage of dates as related to management of the fruit bunch. Rept. Date Growers'

Inst. 15: 7-12. 1 fig. 1938.—In an effort to reduce the spoilage of immature Deglet Noor dates, field exps. were conducted during 1935-37 inclusive, near Indio, California. The most important indication obtained was the reduction of fungus rot by aerating the fruit bunches during the ripening season. Aeration was obtained in 3 ways: (1) by fruit-strand separation with wire rings; (2) by increasing ventilation through the umbrella-like paper tubes which are used regularly for rain protection; and (3) by removing fruit strands from the center of the bunch. During the moderately wet years, such as 1935 and 1936, all of these methods were effective in reducing the percentage of rot and, when used in combination, they were of more benefit than when used singly. In 1937, when there was no rainfall during the fruit-ripening season, rot was not decreased by additional aeration. In hot, dry seasons the separation of the fruit strands is harmful because there is excessive desiccation of the dates.—D. E. Bliss.

5001. GARRETT, S. D. Soil conditions and the centrol of foot-rot disease in cereals. Papers and Discuss. Oxford

Farm. Conf. 3: 133-140. 1938.

5002. HORSFALL, JAMES G., R. O. MAGIE, and R. F. SUIT. Bordeaux injury to tomatoes and its effect on ripening. Tech. Bull. New York State [Geneva] Agric. Exp. Sta. 251. 1-39. 16 fig. 1938.—The factors responsible for the apparent paradox that 4-4-50 bordeaux mixture fails to increase yields of tomatoes commensurate with its ability to control leaf diseases have been under investigation both in the greenhouse and in the field by measuring the growth, blossoming, and fruiting of tomatoes sprayed with varying bordeaux mixtures, lime alone, and copper materials without lime. The explanations commonly given for this paradox are (a) that bordeaux delays ripening or (b) that defoliation from disease accelerates it. Assuming that to redden a fruit is to ripen it, neither explanation seems valid. Bordeaux did not lengthen nor did artificial defoliation shorten the time from anthesis to ripening. Bordeaux, however, did dwarf the plants, kill meristems, deform young leaves and fruits, and cause defloration. These effects were reflected in a reduced final yield and this, in turn, caused the harvest curve to be flatter for sprayed than for nonsprayed plants. Bordeaux also hardened the leaves, accelerated transpiration, decreased growth cracks, caused fruits to russet occasionally, and increased the tendency of the pedicle to adhere to the fruit. It had little or no effect on blossom-end rot. The leaf hardening seemed to be of 2 types, one presumably caused by the Cu, the other by the Ca. Curtailed blossoming seemed to be related to dwarfing. Defloration probably resulted from (a) Cu toxicity (b) accelerated transpiration, and (c) Ca hardening. Much of the damage of bordeaux to tomatoes, such as dwarfing, excessive transpiration, and defloration, seemed to be related either directly or indirectly to the alkalinity of the mixture. In some cases similar damage was caused by acid sprays, but not by neutral sprays.—J. G. Horsfall.

5003. SCHMITZ, HENRY, and FRANK KAUFERT. Studies in wood decay. VII. How long can wood-destroying fungi endure immersion in water. Proc. Amer. Wood Preservers' Assoc. 34: 83-87. 1938.—Trametes serialis, Lentinus lepideus and Lenzites trabea when growing in pine sapwood blocks can endure more than 38 weeks of immersion in water without being killed. Polyporus anceps is killed in about 6 weeks. Even prolonged storage of wood in water cannot be relied upon to kill the wood-destroying

fungi with which it may be infected.—W. H. Snell.

5004. SEMPIO, C. Primo contributo alla conoscenza dell' azione esercitata da vari fattori ambientali su alcune malattie parassitarie di piante coltivate. ("Ruggine del Fagiolo.") [The action of various ambient factors on

some parasitic diseases of cultivated plants (bean rust).] Riv. Patol. Veg. 28(7/8): 241-351. 10 fig. 1938.—A study was made of the host-parasite complex using the 50-day was made of the host-parasite complex using the 50-day kidney bean infected with *Uromyces appendiculatus*, as influenced by temp., light, humidity, CO₂, O₂, u.-v. rays and pressure. The disease period for the purposes of this study was divided into 3 principal phases: (I) from the 1st to the 3d or 4th day; (II) from the 3d or 4th to the 6th day; and (III) from the 7th to the 9th or 10th day from inoculation. The kidney bean rust developed well over the temp. range 14°-24°C with an optimum at 19-20°. Within these limits, the 3 periods of treatment did not show any appreciable differences in behavior. Plants treated show any appreciable differences in behavior. Plants treated during the 3d period at temps. from 27 to 27.5°C showed yellowed foliage in which were bright green islands. In the center of these then were pustules of the fungus. Plants treated at this temp. during periods I and II were almost normal in color. When the plants treated during the III period were returned to more normal temps. (15-20°C) the green islands gradually enlarged and the foliage gradually assumed a normal color. At the end of this time, the plants treated during the period I showed normal pustules surrounded by wide yellow halos of hypersensitivity, those treated during the 3d period were sprinkled with smaller pustules without halos but on slight swellings of the leaf blade. Treatments for 2½ days at 34-36°C completely sterilized the leaf tissues of the mycelium already well developed without damaging materially the tissue of the host. To obtain the same sterilizing effect at 32-34°, it was necessary to prolong the treatment to 4 days which seriously injured the plants. Groups of plants 2 times inoculated and sterilized by heat did not show any immunity against new attacks of rust. CO2 at 9 to 9.5% was markedly toxic to the development of rust in all 3 periods, but the effects were most marked in period II. This effect is attributed to a change in the metabolism toward intramolecular respiration and the fermentation of sugars with the production of alcohol and acetaldehyde. darkness had relatively little effect on the Kidney bean rust but there was a slight increase in disease development when the plants were kept in the dark during the 1st period and a measurable depression when kept dark during the 3d period. Red or green filters did not influence the disease development; the blue filter had a depressing effect. U.-v. had about the same effects in all 3 periods, and tended to repress pustule formation on the irradiated side of the leaf. The leaves were injured less when irradiated for short periods at first and the time progressively increased then when equal periods of treatment were used to give the same total period of treatment (28-30 min.). After the fungus had had time to enter the leaves, the humidity had practi-

had nad time to enter the leaves, the humidity had practically no effect on the further development of the disease.—An extensive bibliography is appended.—F. M. Blodgett.

5005. SEMPIO, C. La cura di platani fortemente colpite dalla Discula platani Peck. Sacc. [The cure of sycamores strongly attacked by D. platani.] Riv. Patol. Veg. 28 (9/10): 365-375. 4 fg. 1938.—In 1933 sycamore trees severely attacked by D. platani as previously described [see B. A. 9(1): entry 232], were severely pruned to remove the diseased twigs and smaller branches, the wounds were treated with 5-6% ferrous sulfate soln., the trunks and stumps of branches were painted with 3-4% bordeaux mixture, and later the sprouts were removed from the trunks to a height of 3-4 m. and the tops sprayed with 1-2% bordeaux mixture. Photographs show the remarkable improvement brought about in the trees. Renewed attacks of this disease occurred in 1936-1937 and Platanus occidentalis continued to be more severely injured than P. orientalis. When the weather for different years is studied

to determine the relations with the disease, the occurrence of fogs and mist for several days seems to be the controlling factor.—F. M. Blodgett.

5006. SEMPIO, C. Effetto delle alte temperature sul frumento cariato al momento della spigature. [Effect of high temperature on bunted wheat at the moment of heading.] Riv. Patol. Veg. 28(9/10): 385-387. 1938.—Wheat grown from seed infested with T. tritici, when subjected grown from seed infested with T. trituc, when subjected to high temp. (32-33°C) for a sufficient time, yields fewer bunted spikes than controls. In one exp. the control not subjected to high temp. gave 88 bunted spikes, 1 partially bunted and 4 healthy; plants subjected to a temp. of 32° for 5½ days gave 6 bunted, 3 partially bunted, and 12 healthy spikes; and those treated for 4 days gave 13 bunted and 5 healthy.—F. M. Blodgett.

5007 SEMPIO. C. Influenza di alcune sostanze, date alle

5007. SEMPIO, C. Influenza di alcune sostanze, date alle piantine per assorbimento, sullo sviluppo della carie del grano. [Influence of some substances, given to the plant by absorption, on the development of bunt of wheat.] Riv. Patol. Veg. 28(9/10): 399-400. 1938.—Wheat seedlings infected by chlamydospores of *Tilletia tritici*, after 60 days from seeding were removed from the soil and placed in nutrient solutions containing various added substances which were renewed every 5 days. After 20 days of such treatment they were replanted in soil and allowed to mature.

ment they were replanted in soil and allowed to mature. Seedlings from control solns. produced no healthy spikes; those from solns. containing Ni, Cd, or salicylic acid had a few healthy or only partially bunted.—F. M. Blodgett.

5008. STEVENS, NEIL E. Departures from ordinary methods in controlling plant diseases. Bot. Rev. 4(12): 677-678. 1938.—[See B. A. 12(10): Entry 15737].

5009. SUZUKI, H. Studies on internal bacteria of rice seeds. VI. Influence of hydrogen ion concentration of the culture media on the thermal death time. [In Jap. with Eng. summ.] Ann. Phytopath. Soc. Japan 7(3/4): 221-230. 1938.

5010. WALLACE, E. R. Experiments on hot water treatment with the addition of chemical disinfectants. (Narcissus). Rept. Bulb Exp. Agric. Inst. and Exp. Sta. Kirton 1936: 38-41. [1937].

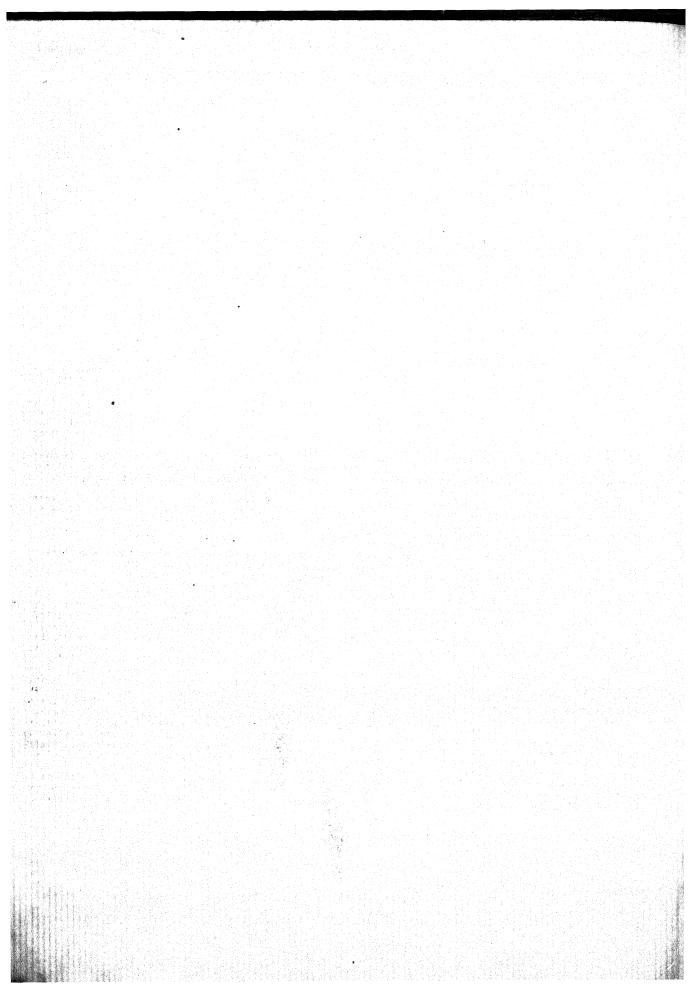
5011. WOOD, J. The hot-water treatment of narcissus bulbs 1935/36. Rept. Bulb Exp. Agric. Inst. and Exp. Sta. Kirton 1936: 25-37. [1937].

MISCELLANEOUS

5012. ASUYAMA, H. New diseases and pathogenes reported recently on the cultivated plants in Japan. IV. [Jap. with Engl. titles & references.] Ann. Phytopath. Soc. Japan 7(3/4): 231-236. 1938.

5013. GRILLO, HEITOR V. SILVEIRA. Observações sobre uma doença de orchideas. [Observations on a disease of orchids.] Rodriguésia [Rio de Janeiro] 3(11): 247-251.
1 pl. 1937(rec'd 8-8-38).—A disease was found, decimating the orchids cultivated in a Brazilian orchid garden. Epiphytic species were here grown in large containers of wet sand. This change of habitat might injure the plants. The only species seriously affected is Cattleya autumnalis. symptoms suggest a bacterial origin of the disease. Bacteria isolated from diseased plants were cultivated and their reactions noted, but the organism was not identified with any previously described. Due to lack of healthy plants it was not possible to attempt exptl. inoculation.—H. Wilkens.

was not possible to attempt expti. inoculation.—H. Wittens. 5014. SEMPIO, C. I succhi virusati quali substrato di culture fungine. [Virus sap as a fungus culture substrate.] Riv. Patol. Veg. 28(9/10): 389-391. 1 fig. 1938.—Thielaviopsis basicola, Trichothecium roseum and Aspergillus niger grew better on sap from healthy tobacco plants, sterilized by passage through a Chamberland filter, than on sap from mosaic tobacco plants similarly filtered.—F. M. Blodgett.



ECOLOGY

Editors

 W. C. ALLEE, Terrestrial Animal Ecology
 G. D. FULLER, Terrestrial Plant Ecology
 CHANCEY JUDAY, Hydrobiology (Oceanography, Limnology)

FREDERICK A. DAVIDSON, Ecology of Wildlife Management—Aquatic W. L. McATEE, Ecology of Wildlife Management— Terrestrial

(See also in this issue Entries [GENERAL AND ANIMAL ECOLOGY]: Breeding behavior, raccoons, 5664; Human ecology—negro-white competition, 6210; Bioclimatics, 6506; Bioclimatics—mosquitoes, 6707; Cycles in population of potato insects, 6697; Arthropods of corn fields, 6698; Population growth in protozoa, 6764; Protozoa, 6772; Subterranean fauna, 6836; Cave-dwelling mite, 6851; Bipolar dist. of tick, 6856; Spiders, 6864; Synchronous flashing of firefly, 6869; Chironomid larva, 6904; Apidae, 6927; Adaptational form changes during growth of fish, 6969; Body weight of birds, 7018; Social behavior in heron, 7019; Geographical variation in wood rat, 7046. [PLANT ECOLOGY]: Species concept and ecotypes, 5266; Geochemistry of cobalt-containing foods, U. S., 5518; Air dissemination of fungus spores, 6046; Humidity requirement of wood-rotting fungi, 6337; Lichen communities on limestone vs. sandstone, 6367; Rubus in Scandinavia, 6413; Migration of Alpine plants along valleys, 6438; Vegetation of Grand Isle, Louisiana, 6439; Reproduction in Ranunculus, 6449; Range improvement, 6483; Internat. grasslands congress, 6493; Rainfall run-off, 6496; Water conditioning for greenhouses, 6522; Soil water and tree growth, 6531; Humidity on transpiring leaf, 6598; Plant foods of Nothrotherium, 7048)

GENERAL

5365. BRANDT, WALTER. Biotypology. II. Growth as factor of development of the individual types and of the ecological types of man. Acta Biotheoretica 4(2): 119-132. 1938.—Growth consists of several successive phases; these are influenced—accelerated or retarded—by the ecological milieu. In "isodromic" individuals (having the same time curve of growth), the same type of constitution is induced by the ecological milieu. In the case of "anisodromic" individuals, the same type can be realized only at the time of identical phases of their growth: "Law of Specific Induction" (1928). The author shows the application of this law in autecology and synecology. Every synecological community consists of a number of "ecological patterns." The synecological community is always the active factor and represents the larger whole of which the ecological patterns are the parts.—W. Brandt.

and represents the larger whole of which the ecological patterns are the parts.—W. Brandt.

5366. DAUBENMIRE, REXFORD F. Merriam's life zones of North America. Quart. Rev. Biol. 13(3): 327-332. 1938.—Forty years ago C. H. Merriam divided North America into 7 life zones. He explained the distribution of these zones on the basis of temp. variations during the period of growth and reproduction. His methods and concepts exerted wide influence and his theory was widely accepted. Recently, however, his work has been much questioned: the boundaries of his zones have had to be altered, the causal factor is not the simple unit factor he supposed, and certain technical errors have had to be corrected.—H. G. Swann.

5367. DICE, LEE R. The Sonoran biotic province. Ecology 20(2): 118-129. 1 fig. 1939.—The Sonoran biotic province is distinguished by its assemblage of species and races of plants and of animals. Many of the peculiar Sonoran races and species of amphibians, reptiles, and mammals have probably differentiated in the province, due evidently to the occurrence there of very distant types of environmental conditions combined with a considerable amount of local isolation. The Sonoran biotic province is also distinguished as an important physiographic province, as an important climatic province, and as a vegetation climax.—L. R. Dice.

5368. HALL, T. F. Jr. An ecological study of the cypress-gum community in the Pearl River valley. Proc. Louisiana Acad. Sci. 4: 251. 1938.—A fresh-water marsh-successional swamp in southeastern St. Tammany Parish, Louisiana, was investigated. Nyssa biftora was found dominant, the subdominants being N. aquatica and Taxodium distichum. Only 22 trees, shrubs, and vines were encountered within the community. The predominant of the herb understory was

Proserpinaca palustris. 96 vertebrates were observed. 5369. HOYT, J. C. Drought of 1936, with discussion on the significance of drought in relation to climate. U. S. Geol. Surv. Water Supply Paper 820. iv +62p. 2 pl., 18 fig. 1938.—The author discusses the causes (deficient and unsatisfactorily distributed precipitation, accompanied by high temps. and warm winds); the effects on ground and surface water, including the stability of the water supply and the decline of lake levels; damage to vegetation, domes-

tic and industrial water supplies, health, power, navigation, and to recreation and wild life; the question of relief in affected areas; major drought years in humid and semiarid States; droughts as related to the semiarid States; the shelter belt; natural vegetation and soils of the Great Plains in relation to climate; droughts as related to crops and to the classification of climate; and variability of climate and climatic risks. An article entitled Backgrounds of Economic Distress in the Great Plains, by H. L. WALSTER, is appended—Courtesy Exp. Sta. Rec.

Distress in the Great Plains, by H. L. WALSTER, is appended.—Courtesy Exp. Sta. Rec.

5370. JACKS, G. V., and R. O. WHYTE. Erosion and soil conservation. Herbage Publ. Ser. Bull. 25. 206p. Imperial Bureau of Pastures and Forage Crops: Aberystwyth, 1938. Also publ. as Tech. Communication 36 from Imperial Bureau Soil Sci.: Harpenden. Pr. 5s.—In compiling this account of contemporary soil erosion, the authors have consulted widely in the literature of the subject, and have had the active cooperation of correspondents and workers throughout the world, and this has enabled them to present a brief but authoritative picture of conditions in the Mediterranean region, U.S.S.R., India, Ceylon, East Indies, China, Japan, French overseas possessions, South Africa, Rhodesia, East Africa, West Africa, U.S.A., Canada, West Indies, Australia, and Fiji. The bulletin contains a mass of information and is well put together, but a useful addition would have been a concluding section summarizing and comparing conditions and developments in the various countries.—From review by W. B. Brierley (courtesy Ann. Appl. Biol.).

5371. MADE, A., und W. RUDORF. Zweck und Aufbau moderner bewetterter Gewächshäuser und ihr Temperaturgang im Vergleich mit dem des Freilandes. Bioklimatische Beiblätter 5(4): 145-153. 10 fig. 1938.—An air conditioning plant (Brown, Boveri & Cie.) for regulating temp., humidity and circulation in a greenhouse is degree to the condition of the circulation of the condition. scribed. The purpose of the installation was to keep the temp. below 22° C. Operation was without thermostats: Continuous temp. records were obtained with radiationprotected resistance thermometers. The mean daily temp. amplitude of 9° C in the open was reduced to 4° C in the greenhouse. On days with considerable radiation the temp. could be kept 8 to 10° C below the outdoor value; in a greenhouse without air conditioning under the influence of radiation values of 9° C above the outdoor reading were reached. Radiation intensities of 0.1 gram calory per sq.cm. per min. produce a noticeable increase of temp. in a nonconditioned greenhouse. The vertical temp, gradient in the conditioned greenhouse is reversed (cool near floor, warm near roof) compared to the daytime situation outside. The cooling mechanism consisted of a well with a rotary pump which delivered 35 cu.m. of water per hour with a temp. of 9.5 to 10° C. This water is circulated through lamellated radiator pipes in the greenhouses and can be heated electrically to the desired temp. Nothing is said about the size of the greenhouses .- H. Landsberg.

5372. NORTON, EDNA M., and EVA OXFORD GERS-BACHER. Stump vegetation at Reelfoot Lake. Jour. Tenn. Acad. Sci. 14(1): 181-185. 2 fig. 1939.—A description, check

list, and illustrations are given of the vegetation growing in the Taxodium distichum stumps in Reelfoot Lake, an earthquake lake. Drawings are shown of the root growth of the plants as found in the stumps. The agencies concerned in transporting plants to this habitat are briefly discussed.—E. O. Gersbacher.

ANIMAL

5373. BALOGH, J. Vorarbeiten zu einer quantitativen Auslessemethode für die bodenbewohnenden Gliedertiere. Zool. Anz. 123(3): 60-64. 1 fig. 1938.—The catch preserved in alcohol is placed in a glass tube having a constriction above and mixed with saturated NaCl soln. Dirt and detritus settle to the bottom and the animals come to the top and by means of a cork mounted on a wire are drawn above the constriction where they can be measured. The bottom material is treated twice more in the same way and

bottom material is treated twice more in the same way and this suffices to recover practically all of the arthropods in the sample.—L. H. Hyman.

5374. DARLINGTON, P. J. Jr. The origin of the fauna of the Greater Antilles, with discussion of dispersal of animals over water and through the air. Quart. Rev. Biol. 13(3): 274-300. 1938.—The region from which most of the fauna of the Greater Antilles appear to have been derived is Central America, and many have favored the view that there was once a land bridge between these two regions over there was once a land bridge between these two regions over which the animals migrated. But this paper holds that such an hypothesis is unsatisfactory on several counts. Both geological and zoögeographical evidence for it are poor. An geological and zoögeographical evidence for it are poor. An alternative hypothesis is suggested that the organisms crossed a water gap, perhaps from Honduras to Jamaica. The chances of dispersal of organisms across water gaps are discussed, partly mathematically, with the conclusion that such dispersals appear reasonably orderly. Wind storms play an important part in such dispersals. The fauna of the Greater Antilles is moderately homogeneous but it is very orderly; the latter appears due to the fact that the animals are still distributed along the migration routes. The fauna also is irregularly depauperate and shows various characteristics of an oceanic fauna.—H. G. Swann.

characteristics of an oceanic fauna.—H. G. Swann.

5375. ERRINGTON, PAUL L. Reactions of muskrat
populations to drought. Ecology 20(2): 168-186. 1939.—
Varying periods of drought from 1934 to 1938 provided
exceptional opportunities to study muskrat (Ondatra zibethica) populations living under emergency conditions especially in central and northwestern Iowa. Although the animals showed considerable tolerance to adverse changes in habitat and to some extent modified their living routines accordingly, their behavior remained basically rather stereotyped. A large proportion of the muskrats resident in drying marshes and streams tended to stay in familiar home ranges and, while they sometimes suffered heavy or even annihilative mortality, were usually more fortunate than the individuals that attempted to go elsewhere. As vicissitudes became intensified, there was a conspicuous increase of intraspecific strife, vulnerability to predation (notably by

of intraspecific strife, vulnerability to predation (notably by mink), random and often lethal wandering, and, in winter, losses from hunger and cold.—P. L. Errington.

5376. PEARSE, A. S. Animal ecology. 2nd ed. xii + 642p. 133 fig. McGraw-Hill Book Co., Inc.: New York, 1939. Pr. \$5.50.—There has been an active advance in ecology in general and apparently also in the author's knowledge of the subject since the first edition of this book appeared in 1926. The present completely revised edition continues to discuss all phases of animal ecology with constant reference to the newer literature. As the preface states, "New chapters include information on climate, evolution, chronology, succession, climaxes, thythms. climate, evolution, chronology, succession, climaxes, rhythms, communities, competition, populations, teaching ecological problems, and economic ecology. 132 illustrations have been added." The text abounds in literature citations and the

skeletonized bibliography fills 65pp.—W. C. Allee.
5377. PENNEBAKER, F. Notes on tree-hole inhabitants of the New Orleans area. Proc. Louisiana Acad. Sci. 4:
250-251. 1938.—An examination of tree-holes in New Orleans revealed the presence of animal communities in which protozoans, rotifers, crustaceans, water-mites, and larvae of mosquitoes, midges, drone-flies and beetles are represented. Special attention to mosquitoes disclosed 6 spp. on which habit-notes are also presented: Aëdes tri-

seriatus, A. aegypti, Culex quinquefasciatus, Megarhinus portoricensis, Orthopodomyia signifer, and O. alba.
5377A. Van DEVENTER, W. C. Studies on the ecology of secondary communities in a deciduous forest area. Ecology 20(2): 198-216.5 fig. 1939.—The secondary community types developing as a result of prolonged human activity in a deciduous forest area may be classified with reference to stability, position and amount of tree and shrub reproduc-tion. Two principal types are recognized: perennial communities, including pastures, field borders, uncultivated orchards, meadows and dwelling environs, and subperennial communities, including all types of cultivated fields. The communities of the dwelling environs and cultivated fields are essentially insular in nature. The species comprising the winter resident and summer resident bird populations develop centers of activity in particular community types. Most species center their activity in the types most closely resembling the primitive communities to which they originally belonged. However, changes in habitat preference on the part of a few man-tolerant species, together with the migration of former prairie species into the more open community types and the introduction of exotics have brought about the development of a bird fauna of mixed origin.—W. C. Van Deventer.

5378. WOOSTER, L. D. An attempt at an ecological

evaluation of predators on a mixed prairie area in western Kansas. Trans. Kansas Acad. Sci. 41: 387-394. 1938.—The evaluation of certain animals in terms of their importance to the general animal community on a mixed-prairie area in mid-western Kansas. The marsh hawk with a score (grams mid-western Kansas. The marsh hawk with a score (grams of food per day per species) of 611 is the most important predator on mixed prairie. Then follow the coyote with 381, Swainson hawk 226, Archibuteos 22 and all other hawks and owls 27. The marsh hawks on a square mile require 16 mice per day or 5840 per year. The coyotes on one square mile (one half an animal), if they ate nothing but jackrabbits, would require 45 per year. To supply the annual needs of all dominant predators on one square mile of mixed-prairie would require, for example, 150 jackrabbits, or 12,000 meadow mice, or 50,000 harvest mice.—
F. C. Gates.

F. C. Gates.

PLANT

5379. BIRAND, HIKMET AHMET. Untersuchungen zur Wasserökologie der Steppenpflanzen bei Ankara. Jahrb. Wiss. Bot. 87(1): 93-172. 1938.—The author analyzed the habitat conditions for these Anatolian plants. The precipitation in different years varied widely. High temp. co-inciding with period of drought results in relative humidity, and evaporation conditions that are equivalent to desert conditions in the dry season. The osmotic values of a series of Anatolian steppe plants were investigated. Plants which develop their foliage in the spring months of relatively high precipitation, as geophytes and ephemerals, have a low and not markedly varying osmotic value; their summer rest is not imposed upon them by the habitat but detd. by heredity. Plants which vegetate throughout the summer are from both morphological and physiological standpoints very dissimilar and behave differently to prolonged drought. 7 ecological groups were thus distinguished on leaf anatomy and root characters and on their osmotic

behavior and powers of drought resistance.—J. Priestley. 5380. FOUILLOY, R. La végétation de quelques mares nivernaises. Bull. Soc. Bot. France 84(7/8): 494-499. 2 fig. 1937.—A succession of plant communities of remarkable distinctness in space, which does not seem to correspond to the same succession in time.

5381. HODGMAN, MARGARET ELIZABETH. The hydrogen-ion concentration of the soil in relation to flora at Squire Valleevue Farm. Ohio Jour. Sci. 39(1): 15-24. 1 pl., 2 fig. 1939.—Soil reaction in an uncultivated area in Cuyahoga County, Ohio, showed variation with organic content, moisture content, and plant cover. The area had a pH range of 3.7 to 7. The majority of plants showed a fairly wide range of soil reaction tolerance and a more limited optimum range. The herbaceous plants appeared to be conserved to the conserved to be somewhat more sensitive to soil acidity than the trees as a group. Of the microflora, the molds were more acid tolerant than the bacteria in soil with a pH less than 4.-M. E. Hodgman.

5382. KÖIE, MOGENS. The soil vegetation of the Danish conifer plantations and its ecology. K. Danske Videnskab. Selsk. Skrifter Nat. og Math. Afd. Ser. 9 7(2): 1-86. 2 pl., 9 fig. 1938.—About 250 analyses of the ground regetation of the Danish conifer plantations were made according to Raunkiaer's methods, each comprising 20 samples. Vascular plants as well as mosses and lichens were investigated. In connection with each analysis measure-ments of light intensities were made with Wiesner's hand insolator according to the method devised by Boysen Jensen, also, 3 measurements of the pH of the surface soil and of the thickness of the raw humus layer. The data of the character, age, and generation of the trees and of the nature of the subsoil are given in 17 tables. The vegetation is divided into about 35 plant sociations, mostly growing in raw humus. After a description of the sociations, a number of examples are given of the distribution of the ground vegetation on different soils according to conditions of light, exposure to sun and wind, height above the ground-water, pH, etc., and of the succession after different soils have been planted with conifers. The limits of light for the most important plant sociations are given. It proved that no difference in the vegetation was observable proved that no difference in the vegetation was observable under *Pinus silvestris*, *P. montana*, and *Picea excelsa* under uniform edaphic and climatic conditions, whereas there was a considerable difference in ground flora found under *Abies pectinata*. As might be expected, humidity is one of the most important ecological factors in coniferous woods, and the distribution of the reservation in coniferous woods, and the distribution of the vegetation is alike no matter whether the different humidity is due to the porosity of the soil, to the sun, or to the wind. Two of the moss plant sociations are apparently distributed chiefly according to the thickness of the raw humus layer, and within fairly narrow limits this thickness is characteristic of the different plant sociations. It is demonstrated that the pH-demands differ even within extremely acidiphilous species, and that accordingly this factor is of importance. It seems that some plants only occur in conifer woods when the raw humus

plants only occur in conifer woods when the raw humus layer attains rather considerable thicknesses due to their special demand for pH.—M. Köie.

5383. LINDQUIST, B. Timmesöbjerg en biologisk studie i bokskogen på möens klint. [Timmesöbjerg:—A biological study in a beech forest on Möens Klint.] K. Danske Videnskab. Selsk. Skrifter Nat. og Math. Afd. Ser. 9 7(4): 1-59. 19 pl. 1938.—This intensive biological study was conducted over a period of 7 years on a lightly-cut. 30 × 40. ducted over a period of 7 years on a lightly-cut 30 × 40 m. area within an all-aged, unmanaged beech forest in Denmark. Trees varied in age from 50 to 300 years. Because of the combined effects of extremely slow growth and severe wind damage, the trees had poor form. Several unique humus forms were found within the stand and described. The dominant plant association was Anemone hepatica—Carex digitata, although many others were present. Using the point method and the Hult-Sernander method, vegetation was correlated with (1) "filtforna" (or duff), humus, and mull types; (2) soil type; and (3) soil physical and chemical analysis.—C. F. Olsen.

5384. NORDHAGEN, ROLF. Versuch einer neuen Ein-

teilung der subalpinen-alpinen Vegetation Norwegens. Bergens Mus. Arbok Naturvidenskapelig Rekke 1936(2, paper 7): 1-88. 1937.—Scandinavian phytosociologists ("the Uppsala school") have been reproved for having divided vegetation into such small units that it is impossible to make a synoptic arrangement. This is clearly disproved by Nordhagen's paper, in which the whole material of Scandinavian phytosociological research in alpine and subalpine regions during the last 25 yrs. is summarized into 19 orders, comprising 1 or more alliances. Many orders and alliances are common to Northern and Middle Europe. This paper marks a very important event in phytosociological research, viz. the successful attempt to correlate the results of the Uppsala and the Zürich-Montpellier schools of phytosociological research on a common basis. Details must be sought in the original paper. Important chapters are those dealing with the bog communities, divided in Scheuchzeretalia palustris (oligotrophous) and Caricetalia goodenowii (mesocutrophous). Other groups to be mentioned are the chionophilous orders Arabidetalia coeruleae (on limestone soil) and Salicetalia herbaceae, and the

alpine heaths. Rhodoretalia ferruginei. Many statistical

alpine heaths, Rhodoretalia ferruginei. Many statistical tables are included.—K. Faegri.
5385. PIEMEISEL, R. L. Changes in weedy plant cover on cleared sagebrush land and their probable causes. U. S. Dept. Agric. Tech. Bull. 654. 1-44. 7 fig. 1938.—The successive weedy plant covers recorded (1928-1935) on several newly abandoned fields in southern Idaho were, first, Russian thistle (Salsola pestifer); then mustards, either flixweed (Sophia parvifora) or tumblemustard (Norta altissima); and next, downy chess (Bromus tectorum). Under flixweed emplanted Russian thistle favorable conditions flixweed supplanted Russian thistle the 3d season, and downy chess supplanted flixweed the 5th. Russian thistle forms the first cover because of its efficient seed distribution but it fails to continue to hold the ground as a dominant. Downy chess and flixweed have the advantage over Russian thistle usually of prior germination and always of prior maturity. The first 2 have first chance at the water supply and fulfill their needs for growth and seed production before Russian thistle is well started. Downy chess has the greatest advantage in this respect, since it matures the earliest. In dense mixed stands where Russian thistle is the dominant, individuals of flixweed or of downy chess may thrive and produce seed when Russian thistle fails. The numbers of plants per unit area of Russian thistle and of the mustards may become so high and the individuals so crowded that they fail to produce seed. Thus the numbers of plants per unit area rather than 'drought" determine the changes in plant cover though low precipitation accentuates the effect of crowding. capacity of a species to withstand crowding and the chances for its continuance as a dominant are illustrated by means of counts made on a sq. m. in one of the plots. The degree of crowding can be expressed in terms of soil space, in sq. cm. per plant, based on the number of plants per unit area and the figure can then be corrected for precipitation. In this way a survival index for the species for a given soil and precipitation is arrived at. The capacity of Russian thistle to withstand crowding is least and flixweed is next. The changes in the weedy plant cover are of importance because Russian thistle and the mustards are breeding hosts of the beet leaf-hopper (Eutettix tenellus), vector of the virus disease (curly top) of sugar beets. Downy chess is not a breeding host. Destructive agencies such as excessive grazing and burning may either destroy a downy chess cover or prevent its development. A Russian thistle cover may

prevent its development. A Russian thistle cover may persist year after year as it does in fields excessively grazed by enclosed stock.—R. L. Piemeisel.

5386. SCHMID, EMIL. Contribution to the knowledge of flora and vegetation in the Central Himalayas. Jour. Indian Bot. Soc. 17(4): 269-278. 1938.—The geological expedition of Heim and Gansser (1936) to the Middle Himalayas collected plants and recorded observations on the alpine and sub-alpine zones of this region. Study of their notes and of the some 200 specimens collected violated their notes and of the some 200 specimens collected yielded an outline of the relations of this flora to the corresponding vegetational units in Eurasia. A comparison of the sub-alpine forest belt (Larch-Pinus cembra), the Pulsatilla-forest-steppe belt, the alpine dwarf shrub-tundra, the Carex-Elyna belt, the Stipa-steppe belt is made and the genetic conditions of these communities are discussed.—E. Schmid. 5387. SILVEIRA, FERNANDO. Mangrove. Rodriguésia

[Rio de Janeiro] 3(10): 131-154, 4 pl, 1937.—From a study of the literature the author concludes that the mangrove community, wherever found, is essentially similar, consisting of plants of the same families and genera, with few exceptions. A list of the species of mangrove of Brazil, with local common names, is given.—H. Wilkens.

5389. WILKINS, W. H., and SHELLA H. M. PATRICK.

The ecology of the larger fungi. III. Constancy and frequency of grassland species with special reference to soil types. Ann. Appl. Biol. 26(1): 25-46. 1939.—An examination, during a period of 2 years, of 20 grassland stations comprising the 3 soil types chalk, clay and sand showed that the total number of fungal species in 1936 was 147 and in 1937 it was 125. Of these, 100 spp. were common so that there was considerable similarity in the fungus floras of the 2 years. Comparison with previous work on oak woods and beech woods indicated that grassland has typically fewer spp. than woodland, moreover the characteristic spp. are quite different. In relation to soil types the number of spp. was greatest on chalk, rather less on sand and about half on clay. The degrees of species constancy is highest on sand where it is twice that on either chalk or clay. There is no definite correlation between constancy of spp. and frequency of individuals, but in general spp. with high constancy values had also high frequency values. Sandy soil had the largest number of individuals viz. 40,000, chalk having 10,000 and clay 5,000. Certain spp. of fungi appear to be equally tolerant of all 3 kinds of soil and more or less equally frequent on each type; a very few spp. are exclusive to one type of soil. Most of the spp. while constantly found on all types of soil, indicate by their frequency values a definite preference. Lists of typical grassland fungi, and of fungi characteristic of each of the 3 soil types, are given with, in each case, some estimation of relative abundance.—W. H. Wilkins.

OCEANOGRAPHY

(See also in this issue Entry 6764)

5390. HENTSCHEL, E. Über quantitative Seihmethoden in der Planktonforschung. Cons. Perm. Internat. Explor. Mer Jour. Conseil 13(3): 304-308. 1938.—Steemann Nielsen's objections to the use of samples taken by net or other forms of strainer, for quantitative estimation of phytoplankton, are upheld; his criticism springs from an erroneous conception of the aim of these methods.—E. Hentschel.

5391. LUCAS, C. E. Some aspects of integration in plankton communities. Cons. Perm. Internat. Explor. Mer Jour. Conseil 13(3): 309-322. 1938.—A number of expts. and observations made in various fields and dealing with various groups of organisms are reviewed in the light of their application to ecological problems. All were concerned with the growth in association of different numbers of organisms, of the same and different spp.; all showed, under natural conditions and in the laboratory, definite modifications of the lives of the organisms (or parts of them) by their varying organic surroundings (the varying numbers of the rest of the community). While feeding in the usual sense of the term may have been partly concerned in some of the relationships, in many it is clear that other biol. processes are involved, and much of the evidence points to the production of secretions and excretions which may have intra- and interspecific effects: other factors are discussed. The relevance of such processes to ecology is pointed out and some examples are discussed in relation to pelagic ecology. In particular, it is suggested that "non-predatory" relationships of this type may lead to a biological conditioning of the water and play a significant part in general growth, succession, "animal exclusion," and in processes of growth within and at the junction of water masses of different origin.—C. E. Lucas.

5392. REDFIELD, ALFRED C. The history of a population of Limacina retroversa during its drift across

5392. REDFIELD, ALFRED C. The history of a population of Limacina retroversa during its drift across the Gulf of Maine. Biol. Bull. 76(1): 26-47. 2 fig. 1939.—A population of small specimens of this pteropod appeared in the eastern part of the Gulf of Maine in Dec., 1933. From collections made during the following 9 months information was obtained showing that the population was homogeneous, that its members grew to maximum size in 5 months, declining in numbers as they did so. A 2d population of small individuals appeared in the Gulf in late spring, originating chiefly from offshore, but possibly in part being offspring of the original population. These were unsuccessful in maintaining their numbers throughout the summer. In addition to the information on the life history of Limacina, the data indicate the rate of drift of the water in its circuit of the Gulf. It supplies also suggestive information on the dispersal of organisms through the lateral mixing of water. It emphasizes the dependence of pelagic organisms upon the current systems of the ocean and the difficulty involved in maintaining a permanent

population in any one locality.—A. C. Redfield.
5393. WIMPENNY, R. S. Diurnal variation in the feeding and breeding of zooplankton related to the numerical balance of the zoo-phytoplankton community. Cons. Perm. Internat. Explor. Mer Jour. Conseil 13(3): 322-337.
3 fig. 1938.—It is suggested that, at certain stages in the mutual relations of zooplankton and phytoplankton com-

munities, there is a greater assimilation by night and reproduction by day in the zooplankton. This is the opposite of the greater vegetative reproduction as shown by the more numerous dividing stages in the phytoplankton at night and the assimilation by day. Considering only the populations sampled by coarse silk nets, the proportion of food containing copepods appears to be a rough index of the zooplankton ratio.—R. S. Wimpenny.

LIMNOLOGY

(See also in this issue Entries 6764, 6836)

5394. BAAS BECKING, L. G. M. On the cause of the high acidity in natural waters, especially in brines. K. Akad. Wetenschap. Amsterdam Proc. Sect. Sci. 41(10): 1074-1075. 1938.—Several salt lakes and volcanic lakes of high acidity were investigated in Australia and the Dutch E. Indies. In a volcanic lake the acidity was caused by volcanic H₂SO₄. In other lakes the acidity was caused by oxidation of sulphites, a process which at least is partly due to the action of bacteria.—J. van Overbeek.

by obtain of shiphtes, a photess which a least is partly due to the action of bacteria.—J. van Overbeek.

5395. CHANDLER, DAVID C. Plankton entering the Huron River from Portage and Base Line Lakes, Michigan. Trans. Amer. Microsc. Soc. 58(1): 24-41. 1939.—Portage and Base Line Lakes, located 0.2 mile apart, are similar in physical and chemical conditions. Their outlets unite to form a portion of the Huron River. From Oct., 1931, to Mar., 1933, a study of the net plankton of the 2 outlets showed a marked similarity in respect to quality, quantity and seasonal variation. The 131 plankters identified were common to both outlets and were distributed as follows: Myxophyceae 12, Bacillariales 31, Chlorophyceae 19, Protozoa 20, Rotifera 34, and Crustacea 15. An 11-month's study designed to compare the plankton of Base Line Lake with that of its outlet revealed that plankton leaving the lake was qualitatively representative of that in the lake proper, but the quantity of plankton per liter in the lake proper was several times greater than that in the outlet.—D. C. Chandler.

5396. KUHNE, EUGENE R. Preliminary report on the productivity of some Tennessee waters. Jour. Tenn. Acad.

Sci. 14(1): 54-60. 1939.

5397. MORTIMER, C. H. A discussion on freshwater biology and its applications. II. Physical and chemical aspects of organic production in lakes. Ann. Appl. Biol. 26(1): 167-172. 1939.—The potential production of algae in a lake is limited by temp., light, and the rate of supply of certain nutrient substances, notably nitrates and phosphates, to the water from the mud and the drainage basin. Thermal stratification of lake water in summer and mixing in winter impose a seasonal rhythm on production. Methods of measuring production and the value of chemical data in forecasting production in large bodies of water are discussed. Although the fish production in measured carp ponds is about the same (190 lbs. per acre) as meat production on good pasture, fish production in natural waters falls far below this figure.—C. H. Mortimer.

5398. ROSENBERG, MARIE. A discussion on fresh-

5398. ROSENBERG, MARIE. A discussion on freshwater biology and its applications. III. Algal physiology and organic production. Ann. Appl. Biol. 26(1): 172-174. 1939.—A short survey is given of processes relating to production in a lake, and the annual periodicity of planktonalgae in Windermere is outlined. Some routine physical and chemical observations are descr., and the results obtained are correlated with biological results. Stress is laid upon the necessity of investigating the physiology of plankton algae in the laboratory to test conclusions drawn from parallel biological, physical and chemical observations in the field. A better understanding of the complicated interaction of factors can only be expected from a closer collaboration between ecology and experimental work.—M.

Rosenberg.
5399. WORTHINGTON, E. B. Freshwater biology and its applications: Introduction. Ann. Appl. Biol. 26(1): 165-167. 1939.—Research on the productivity of water is far behind that of the land, but as factors are elucidated they can be applied for purposes of increasing productivity (for fisheries) or reducing it (for water-supply). The principle of change in environments caused by physical and biological processes is of great importance, for it

appears that some reservoirs have changed (towards greater productivity) more in 50 years than some natural lakes have in 15,000 years. Means of retaining the status quo by cropping water is essential in order to keep reservoirs in good condition.—E. B. Worthington.

WILDLIFE MANAGEMENT-AQUATIC

(See also the section "Pisces"; and Entries 5397, 5399, 6259, 6823, 6827)

5400. CLEMENS, W. A., D. S. RAWSON, and J. L. McHUGH. A biological survey of Okanagan Lake, British Columbia. Fish. Res. Canada Bull. 56. 1-70. 2 fig. 1939.—Okanagan lake in southern British Columbia is 67 miles long and has an average width of about 2 miles. The observed maximum depth is 670 feet. Morphometry, temp., O₂ and nitrogen analyses indicate it as an extremely oligotrophic type. The net plankton of the open water is small in amount and the macroscopic bottom organisms are scanty. The lake supports a considerable number of fishes of which the Kamloops trout (Salmo gairdneri kamloops) is the most important because of its value as a sport fish. The Eastern whitefish (Coregonus clupeaformis) has been introduced and become established but not in sufficient numbers to support a commercial fishery. The so-called coarse fishes (suckers and minnows) of the shallow waters are abundant and present an important problem in respect to utilization.—Auth. summ.

5401. ESCHMEYER, R. W., and O. H. CLARK. Analysis of the populations of fish in the waters of the Mason Game Farm, Mason, Michigan. Ecology 20(2): 272-286. 7 fig. 1939. -Studies were made in two streams and the $8\frac{1}{2}$ acre pond formed by impounding their waters. After the first derris root poisoning 13 species,* weight 166.2 pounds per acre, were taken from the larger, slower, warmer, partly open stream. A third of the fish were creek chubs with Johnny darters next in numbers. At the second poisoning 40 days later creek chubs and mud minnows had repopulated the area to a much greater extent than had other species. In the relatively rapid, vegetationless, shaded, smaller stream, 7 species, weight 65.9 pounds per acre, were taken, mainly creek chubs and mud minnows, the black-nosed dace and Johnny darters being about 10%. Forty days later 80% of the fish were creek chubs as compared with 42.5% in the first study, and 8.4% were mud minnows. Larger fish appeared to migrate more than smaller ones. Blunt-nosed minnows showed decided preference for the larger stream. A 20-gallon sample of fish from the pond yielded 12 species; only black crappies and long-eared sunfish were found ex-clusively in the pond. More than one-half the fish were blunt-nosed minnows. White suckers and goldfish showed preference for the pond. There were few game fish and the too-abundant populations of suckers, goldfish and sun-fish were stunted. Impoundment apparently increases the yield of forage fish. Open streams were more productive of forage fish than shaded areas. Valued at one cent per fish of bait species, the standing crop in the larger stream was worth \$192 per acre; in the smaller, \$95 per acre. O. H. Clark.

* Creek chubs (Semotilus atromaculatus atromaculatus); Johnny darters (Boleosoma nigrum nigrum); Blunt-nosed minnows (Hyborhynchus notatus); Mud minnows (Umbra limi); Black-nosed dace (Rhinichthys atratulus meleagris); Black crappies (Pomoxis sparoides); Long-eared sunfish (Xenotis megalotis peltastes); White suckers (Catostomus commersonnii commersonnii); Goldfish (Carassius auratus).

5402. FOERSTER, R. E. An investigation of the relative efficiencies of natural and artificial propagation of sockeye salmon (Oncorhynchus nerka) at Cultus Lake, British Columbia. Jour. Fish. Res. Bd. Canada 4(3): 151-161. 1938.—From 3 tests each of natural propagation and of artificial propagation involving liberation of free-swimming fry and 2 tests of artificial propagation involving planting of eyed eggs, it was found that no statistically significant difference occurred between the 3 methods. Computing the percentage efficiency as the number of seaward migrants produced from the total eggs handled, natural propagation varied from 1.05% to 3.23%—an average of 1.80%; fry liberation from 2.42% to 4.54%—an average of 3.24%; and egg planting from 1.45% to 4.71%—an average of 3.08%.

Losses occurring during the 5 years' stripping and hatchery operations were recorded and, based on total eggs, the hatchery product available for distribution represented from 61.0% to 86.0% for egg planting and from 63.4% to 78.5% for fry liberation. There occurred a lake mortality of approx. 96% of the number of fry liberated. The conclusion was reached that in an area such as Cultus lake, where a natural run of sockeye occurred with a reasonable expectancy of successful spawning, artificial propagation, as commonly practised, provided no advantage over natural spawning, as a means of maintaining the run.—Auth. abst.

spawning, as a means of maintaining the run.—Auth. abst. 5403. FOERSTER, R. E. Mortality trend among young sockeye salmon (Oncorhynchus nerka) during various stages of lake residence. Jour. Fish. Res. Bd. Canada 4(3): 184-191. 1938.—Young sockeye salmon, marked and liberated into Cultus lake, B.C., at intervals during the year were counted as seaward migrants. A linear relationship between time in the lake and % survival was found for periods of from 9.5 to 3.5 months, and from this the trend in percentage loss is computed. Mortality is heavy during the first few months—approx. 65.4% in the first 2.5 months—decreasing as the year advances.—Auth. abst.

5404. GRAHAM, MICHAEL. Growth of cod in the North Sea and use of the information. Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions 108(1): 57-66. 2 fig. 1938.—If the stock be in equilibrium with fishing so that, excluding fluctuations, the numbers have no tendency to increase, decrease or alter in relative proportion, the total contribution of growth to the stock in g. per annum is given by NWG. N is number of fish; W,

weight; and G, weighted average growth rate derived from $(\log w_2 - \log w_1)$

NWG is estimated for different states of equilibrium between the stock of cod and fishing by trawlers from Grimsby.—F. N. Clark.

5405. MEYER, PAUL-FRIEDRICH. Drepanopsetta-Besiedlung der westlichen Ostsee. Eine Folge von Larvenverfrachtungen im Jahr 1930. Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions 102(5): 1-7. 1937. —The long rough dab, a frequent visitor to the west Baltic, has been taken in depths greater than 20 m. Whether depth or bottom and food conditions is the limiting factor is not known. The greatest number of dabs were found on smooth bottom heavily populated with Ophiura albida. In some months of 1932 and 1933 the catch of Drepanopsetta equalled or exceeded the catch of the dab, Pleuronectes limanda. In 1934 the catch of long rough dab was slightly larger. This unusual abundance of Drepanopsetta is probably caused by the incoming of eggs or young stages. Seventy to 80% of the 1933 and 1934 landings were composed of the 1930 year-class. The early stages of this year-class may have been brought into the Baltic by the large influx of North Sea and Atlantic water reported in the spring and summer of 1930. The failure to find eggs, larvae or ripe individuals in the west Baltic indicates that the adults move out of this region when maturity is attained. In 1936 the 1929 year-class had disappeared from the catch, the 1930 group was much reduced in numbers, and the 1934 year-class dominated. Meanwhile the total catch decreased. This decrease is not attributed to overfishing but to the outward migration of mature fish.—F. N. Clark and P. M. Roedel.

5406. RICKER, W. E. "Residual" and kokanee salmon in Cultus lake. Jour. Fish. Res. Bd. Canada 4(3): 192-218. 1938.—The sockeye salmon in Cultus lake are of 3 kinds: the normal anadromous stock; a "residual" group, not anadromous, but largely or perhaps wholly the progeny of anadromous fish; and a stock of non-anadromous kokanee, which have no known connection with the anadromous or residual fish at the present time. Morphological and physiological peculiarities distinguish the 3 kinds at maturity. In the segregation of the progeny of a spawning of anadromous fish into migrant and residual groups, rate of growth and sex play a determining rôle.—Auth. abst.

5407. SCHAEFER, MILNER B. Preliminary observations on the reproduction of the Japanese common oyster, Ostrea gigas, in Quilcene Bay, Washington. Biol. Repts. Washington State Dept. Fisheries 36E. 1-36. 1 fig. 1938.—

as, introduced from Japan, reproduce naturally in a nited localities in Washington. Studies of the repro-e activities and associated ecological factors were ted in 1936 at Quilcene Bay, a locality which gives e of having a regular spat fall. Hydrographic records d temp., salinity and pH throughout most of ar. In 1936, spawning commenced before July 1 and ned until the middle of Sept., taking place principally n July 28 and Aug. 12. It occurred at temps. conly lower than those recorded by previous investi-as critical temps. for the spawning of this species. te of larval development, studied by means of occurof size groups of larvae in the plankton, appears to octly correlated with the water temp. Most larvae ping late in the season perished before setting size iched, apparently as the result of water temp. below nimum for larval development. Larvae were found when about 270 μ in height, from the early part of till early Oct., with most of the setting taking place Large variations in amount of setting at different are recorded. The setting was correlated with ar tidal period, being most intense during near tide and least intense during spring tide periods; this difference ity is not due to periodic variations in temp., pH or rate of spawning. The number of larvae on glass plates and concrete-coated cardboard spat rs was found to be a function of the angle of the of attachment; the largest number of larvae attach r horizontal surfaces, the number decreasing as the 1th the under horizontal becomes greater.—L. A.

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SCHOFFMAN, ROBERT J. Age and growth of eared sunfish in Reelfoot Lake. Jour. Tenn. Acad. 1): 61-71. 1 fig. 1939, also in: Report of Reelfoot iological Station, 3: 61-71. 1939.—Age detns. of 563 d sunfish, Eupomotis microlophus, were made by ng the scales for the presence of annular rings. les were examined by a modification of the method offman (1938). The modification consisted of the stion of a new type of polariscope using polaroids in polarized light. Sex determinations of the redmish revealed no apparent difference in their growth, aching legal length (6 inches) in their 3d summer. The 3d attained the greatest weight for length the 4th summer and the \$\Phi\$ during the 5th summer -R. J. Schoffman.

WALES, J. H., and RICHARD BLISS. Progress of transfered in a varieties to 1936. Collinguia Etch

of trout feeding experiments, 1936. California Fish ame 23(2): 138-143. 1937.—Dehydrated beef meal an excellent fresh meat substitute for Brook trout inus fontinalis). Trout weighing 25 per oz. or more fed dry meals combined in pellet form twice a day sh liver once a day with better results than when eals are mixed with meat in non-pellet form. No tion was found between diets containing various nations of liver, salmon egg, dry milk, beef meal and meal and the severity of furunculosis.—J. H. Wales.

WALFORD, LIONEL A. Effect of currents on oution and survival of the eggs and larvae of the ck (Melanogrammus aeglefinus) on Georges Bank.

U. S. Bur. Fish. 49(29): 1-73. 29 fig. 1938.—The aims U. S. Bur. Fish. 49(29): 1-73. 29 fig. 1938.—The aims is study were to chart the spawning grounds of the ican haddock on Georges Bank (situated to the S of Cape Cod) in 1931 and 1932; to trace the drift e eggs and larvae; to find whether Georges Bank was lied with young haddock from other breeding grounds; to learn the effect on the brood of changes in the tion of drift. These purposes were met by a study is vertical and horizontal distribution of different ages ggs and larvae. Although spawning of the haddock occur over the whole of Georges Bank, it tends to be occur over the whole of Georges Bank, it tends to be entrated in certain definite areas. It is probable that eastern part of the bank may normally be such an and that other regions, for example, the South Channel e southern part of the bank, may or may not become retant breeding grounds during any year. At spawning, ock eggs seem to adopt the sp. gr. of the water into h they are deposited, and in general, to remain sused in the same stratum until hatched. Thus the origin gs in late stages of development could be traced by

following the strata in which they were found to wherever such water touched bottom, where haddock spawn. In Mar., 1931, the eggs were spawned mostly on the eastern and southeastern parts of the bank. Since the water there exhibited no directional drift, the eggs remained on the spawning grounds throughout development. In Apr., 1931. spawning continued in the same grounds on a smaller scale; and the eggs were carried southwest by a current which moved toward Nantucket Shoals around the southern edge of the bank. Some of these eggs evidently drifted into the region of Georges Shoals. By the end of May, 1931, spawning had practically ceased on the bank. Georges Bank seems to have supplied its own brood during the 1931 spawning season, receiving no recruits of young from outside breeding grounds. In Apr., 1932, spawning occurred on the eastern part of the bank and in the South Channel. Although there was at that time a southwest drift com-parable to that of the previous year, there were also evidently important drifts southward and northward off the edge of the bank, which seem to have carried significant quantities of eggs away. The resulting loss of young evi-dently seriously affected the success of the 1932 year brood, which appears to have been a relatively small one. There was no evidence that young haddock emigrated from other breeding grounds in 1932. Thus, it was found that the bank supplied its own stock and that changes in drift were responsible for fluctuations in the success of year

classes.—L. A. Walford.
5411. WILDING, J. L. The oxygen threshold for three species of fish. Ecology 20(2): 253-263. 4 fig. 1939.—A total of 678 fish was used to determine the asphyxial oxygen concentration for three species of fish, the yellow perch (Perca flavescens Mit), the steel-colored shiner (Notropis whipplis Gir.), and the blunt-nosed minnow (Hyborhyncus notatus Raf.). Two methods were used; in the first, the fish reduced the oxygen concentration of the water by their respiration, and in the second, water having a low oxygen content was run through closed flasks containing fish. The time required to reduce the oxygen value of the water to an asphyxial concentration differed considerably in the two methods; however, the asphyxial oxygen value was found to be approximately the same regardless of the duration of the experiment. Fish were capable of reducing the oxygen to a lower concentration when the temperature was reduced, but the carbon dioxide content and the range of pH had no apparent effect upon the asphyxial oxygen concentration. A large amount of individual variation was encountered in each species of fish although they were of a similar size and under the same experimental conditions. The minimum amount of dissolved oxygen tolerated by the yellow perch, steel-colored shiner, and blunt-nosed minnow was found to be 2.25 p.p.m. at a temperature range of 20° to 26°C.— J. L. Wilding.

5412. WIMPENNY, R. S. A routine method for the estimation of fat in plankton and its application to herring tissues. Cons. Perm. Internat. Explor. Mer Jour. Conseil 13(3): 338-348. 5 fig. 1938.—A routine method for determining the fat-content of plankton samples is described. It consists of extraction in glass tubes plugged with glass wool. The method has also been applied to herring tissues, but is not valid for the high values found at certain times in muscle fat. The mean of 6 plankton samples taken off the Yorkshire coast with a Hensen net for the year 1935 is compared with the mean of detns. on 10 herrings for the period May-Sept. at Shields, and Oct. and Nov. at Lowestoft. The plankton maximum occurred in Aug.; that for the herring, in July. The individual fat content for herring muscle, collected off East Anglia in 1934, 1935 and 1936, showed a tendency to approximate at the time of the New Moon. The gonads of the East Anglian Autumn herring increase their fat-content, while that of the liver falls, as the fishery proceeds.—R. S. Wimpenny.

WILDLIFE MANAGEMENT—TERRESTRIAL

(See also the section "Aves"; and Entries 6206, 6249, 7037) 5413. AUSTIN, OLIVER L. Some results from adult Tern trapping in the Cape Cod colonies. Bird-Banding 9 (1): 12-25. 1938.—Adult Terns are caught in the colonies by nest-trapping. The presence of unpaired birds is indicated by the taking of 3 birds on a single nest. The colonies (3 from 20,000 to 40,000; 6 or 7 between 200-2000, each) are composed of \$\frac{2}{3} \textit{Sterna hirundo}\$, \$\frac{1}{3} \textit{S. dougalli}\$, and about 400 \$S. paradisaea\$ in all. In 1937, the 10th year of the study, 43.95% of the birds trapped had been banded in previous years. Data indicate that Terns do not begin active reproduction until their 3d year, attain maximum fertility in the 4th, retain fecundity for 3 years, then decline, until, at about 10 years, they are not reproducing effectively. The small number trapped of birds over 10 years old is interpreted as indicating mortality rather than sterility. Three groups are known to have originated when an older, very large colony was broken up by continued mammal predation.—D. S. Lehrman.

5414. BEADEL, H. L. Hawks vs. quail on quail preserves. Jour. Wildlije Management 3(1): 42-45. 1939.—Experience of a lifelong hunter and preserve owner for a score of years with hawks in relation to quail. Kills by hawks are by no means so common as ordinarily assumed and these birds often get cripples, birds that are best eliminated anyway. Moreover the hawks feed on rodent and serpent enemies of quail. Blue darters or accipitrine hawks are an exception but as the average man can not distinguish them, he had better leave all hawks alone. Plenty of escape coverts can easily be provided and they furnish practical protection against even blue darters. The author sums up: "My experience indicates that an above-average quail population can not only be maintained, but is more easily maintained by leaving hawks unmolested than by killing them."—W. L. McAtee.

5415. BECK, HERBERT H. Status of the Upland Plover. Cardinal 4(7): 163-166. 1938.—In Lancaster County, Pa., the numbers have increased from 1921 to 1937. The increase is apparently due to protection of the species in the U.S. since 1913.—D. S. Lehrman.

5416. BISSONNETTE, THOMAS HUME, and ALBERT GEORGE CSECH. Pheasants activated by night-lighting return to normal nesting. Jour. Wildlife Management 3(1): 26-30. 1939.—Black-neck pheasants (*Phasianus c. colchicus*) (3 hens), ring-neck pheasants (*P. c. torquatus*) (2 hens), and Mongolian pheasants (P. c. mongolicus) (5 hens) with cocks, were night-lighted, Jan. 6-April 3, in small pens without cover, then released into large pens, abundant cover, and normal days like those of controls (4 hens and a cock) of each variety. Exptls. began to lay Feb. 24, 21, 28, respectively, and averaged 0.377, 0.322, and 0.573 eggs per hen per day for first 15 days. Controls laid from April 7, 6, and 3, respectively, 0.483, 0.566, and 0.816 eggs per hen per day for their first 15 days. Hatchability of both controls and exptls. was high as judged by samples set under hens. After release, ring-necks laid only 2 eggs loose in the pen and built no nests; black-necks laid some scattered eggs, built a nest, and set on 12 eggs laid therein; Mongolians did likewise, setting on clutches of 12 and 13 eggs. Reset under hens, these clutches yielded 91% fertility and 83% hatch for black-necks and 87% and 79%, respectively, for Mongolians. These last 2 vars. can be used to get numerous early fertile eggs and still be planted later in suitable regions with good prospects of producing broods in the immediately following normal breeding season. Ringnecks seem to be less adaptable for such double use.—T. H. Bissonnette.

5417. BURROUGHS, R. D. An analysis of hunting records for the Prairie Farm, Saginaw County, Michigan, 1937. Jour. Wildlife Management 3(1): 19-25. Map, 2 pl. 1939.— The Prairie Farm (8,401 acres) is so isolated by rivers and canals that it is possible to register all hunters, and to determine their success. The survey involved 2,181 man-days of hunting. The average number of hunters per day was 128, which is equivalent to 9 hunters per sq. mile of range. The total kill of 3 pheasants was 616, which is equivalent to 47 per sq. mile, or 1 for each 13.6 acres. Sight records indicated a sex ratio of 1 3 to 2 ? pheasants. Comparison of the kill per gun-hour on the first 3 and the last 3 days of the hunting season indicated that less than half of the cocks inhabiting the area were killed. These data were used for estimating the total pheasant population on the Prairie Farm at the opening of the hunting season, which was calculated to have been 3,696 birds; or 1

pheasant for each 2.2 acres. Subsequent observations did not disclose any evidence of over-shooting.—R. D. Burroughs.

5418. HAMERSTROM, F. N. Jr., and JAMES BLAKE. A fur study technique. Jour. Wildlife Management 3(1): 54-59. 2 fig. 1939.—The method, designed for ditch- and stream-dwelling furbearers on a 100,000 acre area in central Wisconsin, consisted of repeated surveys. Fur sign was mapped, by species, by the use of symbols (reproduced in the paper). Notes on animals seen, mortality, foods, water levels, etc., were taken. Field maps were transferred to large-scale base maps for permanent record. The 200 miles of ditches and streams were covered by 2 crews of 2 men each in 17 days. 5 surveys were made between May 1936 and Aug. 1937. The survey data, summarized in the paper, showed where the animals were at different seasons, exactly where range improvement was necessary, where not needed, where impracticable, and what factors needed to be manipulated; where refuges should be placed. On an area too large to census and lacking kill records, abundance and distribution of sign can be used in empirical regulation of trapping. Suggestion: censuses of sample areas of heavy, medium, and light sign could be applied to the mileage of inhabited shore shown on maps to give a more accurate population figure than the general estimates so often used.—

F. N. Hamerstrom, Jr.
5419. KLEMOLA, V. M. Finnish game and hunting.
Silva Fennica 40: 1-27.5 maps. 1937.—Account of game spp., their distribution, and prevalence. The mallard forms half of the waterfowl population and the black grouse predominates among upland game birds. Spp. are grouped as they are attracted or repelled by cultivation and other human activities. The brown hare and partridge, both newcomers, are most important among game spp. favored by cultivation, and the ptarmigan, capercailzie, and hazel grouse among those driven away. Rational hunting is not destructive to the fauna but most of the hunting, both past and present, is irrational and constitutes plundering of the fauna. The record in extermination and near extirpation reads something like that of the U.S.—the beaver extinct, and the marten, lynx, otter, bear, wolf, and wolverine seriously threatened. The introduced muskrat is spreading despite intensive trapping. Game zones, correlated with vegetation and climate, and their inhabitants are discussed in some detail. Methods of hunting, both primitive and modern, are described. The harvesting of game and fur as an economic factor was of decisive importance in earlier times and is still depended upon to some extent, although game on the whole has greatly decreased. Statistics are given on the take of fur animals including in a Table the number of individuals of 6 spp. reported in representative years since 1880. [When the take can be so stated in numbers of 55 or under as for 4 spp. (bear, wolf, lynx, and wolverine) in all years since 1920, it would seem that the animals concerned are near extinction.] The bag of game birds, itemized for 1933-34, seems very large. The monetary value of game is estimated at from 30 to 40 million Finnish marks (\$756,000-\$1,008,000) annually. The State compensates for damage by bear and elk and pays bounties on several fur animals, the bulk of the total amount for seals. Private organizations for game protection are increasing in importance. Under a law of 1934, fees paid by members to the State are expended for game preservation. Members are entitled to hunt only in areas for which they have permits. The work of the associations (about 200 in number) is conducted by local boards, which have the cooperation of advisors associated with an inspector of hunting in the Ministry of Agriculture. The present game laws are described and their prohibitions and closed seasons tabulated. 6 mammals and 7 birds are given total protection. The general text of the article abstracted is in English and a

summary is in Finnish.—Courtesy Wildlife Review.

5420. LEOPOLD, ALDO, ELLWOOD B. MOORE, and LYLE K. SOWLS. Wildlife food patches in southern Wisconsin. Jour. Wildlife Management 3(1): 60-69. 1939.—90 food patches of 30 grains were offered during 4 years, and their consumption by wildlife deduced from tracks, flushing, observation from blinds, and stomach analyses. The authors conclude that desirable summer and fall foods must be palatable and easily lodged; winter foods must be stiff-stemmed and unpalatable enough to escape earlier ex-

haustion; spring foods must be unpalatable and easily lodged so as to remain protected by winter snow. The 30 grains are classified according to these criteria, and according to their value to quail, pheasants, and winter songbirds. Their phenology is recorded in tabular form. A key is given for the design of composite patches which combine the properties needed at various seasons. Some grains show a different palatability when offered on the stalk than when exposed

palatability when offered on the stalk than when exposed as shelled grain in hoppers. Consistency or inconsistency with hopper tests is pointed out.—A. Leopold.

5421. LEWIS, HARRISON F. Size of sets of eggs of the American eider. Jour. Wildlife Management 3(1): 70-73. 1939.—Record of 1,131 sets of Somateria mollissima dresseri observed on north shore of Gulf of St. Lawrence in 1934-1938. One to ten eggs each, average 4.04. Annual averages range from 3.89 (1936) to 4.25 (1938). Sizes of sets in descending order of frequency are 4, 5, 3, 2, 6, 1, 7 and 8, 10. Average number of eggs before mid-June, 3.97; after mid-June, 4.08.—H. F. Lewis.

5422. McATEE, W. L. The electric fence in wildlife management. Jour. Wildlife Management 3(1): 1-13. 2 pl. 1939.—Electric fencing promises to solve outstanding difficulties.

1939.—Electric fencing promises to solve outstanding difficulties of the wildlife manager, but the device needs perfecting and constantly cautious and intelligent use. Types of fences, means of electrifying them, and methods and difficulties of installation are described. Experiences reported to date in controlling animals are quoted with reference to antelope, bear, buffalo, cat, coyote, deer, elk, fishes, livestock, rabbits, and raccoon. The article contains suggestions, objections, and cautions relative to the use of electric fences, and concise directions as to what to do in case of severe electrical shock.—W. L. McAtee.

5423. McCANN, LESTER J. Studies of the grit require-

ments of certain upland game birds. Jour. Wildlife Management 3(1): 31-41. 1939.—Experiments with bobwhite quail, Colinus v. virginianus, and ring-necked pheasants, Phasianus colchicus torquatus, on floored pens showed that a continued gritless ration resulted in loss of weight and death, probably due to mineral deficiency associated with lack of fresh grit. When feeding insoluble grit (quartz) it was found that grit consumption increased markedly, but would decrease almost immediately if Ca were added. Glacial gravel fed as grit did not undergo such increased consumption, and if substituted for quartz after an increase had occurred, would give the same effect as Ca. Thus, since grains are known to be Ca-deficient, it appears that granivorous birds depend upon grit for some of this necessary element. Glacial gravel, in some areas at least, is capable of supplying it. These facts gain ecological significance when correlated with the known success of certain exotic, granivorous birds in some glaciated areas or areas having limestone outcroppings, and their known failure in certain unglaciated areas.—L. J. McCann.

5424. MUNRO, J. A., and W. A. CLEMENS. The food and feeding habits of the red-presented merganser in British

Columbia. Jour. Wildlife Management 3(1): 46-53. Map. 1939.—The red-breasted merganser (Mergus serrator) is an abundant visitant to the coast regions of British Columbia from Sept. to Apr. inclusive. Thus the relation of the species to the fisheries is seasonal and centers chiefly about its feeding habits on the coast waters. The food of 96 specimens taken on the lower stretches of coastal streams consisted largely of salmon eggs and sculpins; that of 15 specimens taken on the sea comprised chiefly herring with a smaller percentage of salmonoids, eulachons, sticklebacks, sculpins, blennies, rockfishes, and crustaceans.—J. A. Munro.

ALGAE

(See also in this issue Entry 6600)

6327. CAVALLERO, CESARE. Fenomeni di dissociazione in un'alga coprofita aclorica. (Prototheca portoricensis var. trispora Ashf. Cif. et Dalm., 1930.) [Dissociation in an alga, P. portoricensis.] [With Eng. summ.] Giorn. Batteriol. e Immunol. 22(2): 259-267. 1939.—With the aid of chemical antiseptics and dyes, a strain of P. portoricensis, a coprophytic colorless alga was dissociated into 2 phases, smooth (S) and rough (R). R cells were larger, more easily agglutinated, less stable, and had a slower life cycle than the S cells. The dissociation is regarded as a variation

rather than a mutation.—W. N. Berg.

6328. HOLLENBERG, GEORGE J. Culture studies of marine algae. I. Eisenia arborea. Amer. Jour. Bot 26(1): 34-41. 30 fig. 1939.—Sexual plants of Eisenia were cultured at room temp. in shallow containers in a nutrient soln. of sterile sea water. Sori were sectioned and the development of the sporangia and of spores described. The zoöspores are motile and of the usual form with a stigma. The sexual plants and the life cycle are similar to those descr. for other members of the Laminariales. Cytological details of the development of sex-organs and of gametes, and the subsequent release and fusion of the sex cells were studied from living cultures and from stained slides of fruiting gametophytes. Antheridia are borne in clusters on any cell of the d filaments, but do not arise by transformation of the cells of the filaments. The tips of mature oögonia usually bear numerous papillae. The rupture of this population of the cells of the filaments. this papillate tip releases the egg. Antherozoids contain a number of chromatophores. The cytoplasm and chromatophores of the antherozoid are incorporated in the fertilized egg. Sexual nuclei fuse as 2 sets of chromosomes rather than in interphase. The spores and sexual plants are haploid, meiosis occurring during the first nuclear division in the sporangium. The sporophyte is diploid. *Eisenia* is a diplohaplont, n=15...G. J. Hollenberg.

6330. MAY, VALERIE. A key to the marine Algae of New South Wales. 1. Chlorophyceae. Proc. Linn. Soc. N. S. Wales 63(3/4): 207-218. 1938.—A list of the Algae found on the coast of New South Wales was compiled from an examination of the collections at the Natl. Her-barium, Sydney, The Council for Sci. and Industr. Res., Canberra, and the Univ. of Sydney, and from all other available references. A key to the Chlorophyceae (part 1) of this list is presented, with a list of accepted synonyms.-

V. May.

6331. SCHMIDT, O. C. Zwei neue Helgoländer Grünalgen. Hedwigia 77(5/6): 231-232. Illus. 1938.—Sykidion droebakense and Characium hagmeierianum, both epiphytic on

Cladophora.

6332. SCHUSSNIG, BRUNO. Vergleichende Morphologie der niederen Pflanzen. Erster Teil: Formbildung. viii + 382p. 470 fig. Gebrüder Borntraeger: Berlin, 1938. Pr. 36M unbound; 38M bound.—This comparative morphology of the lower plants considers the algae and fungi as a whole, and takes them up topic by topic instead of group by group. The present volume covers the vegetative structures; the 2d part will cover the reproductive organs, alternation of generations, sexuality, heredity, and evolution. The book is divided into 4 sections, and in each of them much more attention is given to the algae than to the fungi. The 1st section, the comparative morphology of the cell, discusses the cytoplasm, the nucleus, the locomotor apparatus, the plastids, the vacuolar system, and the cell membrane. In each chapter there is a comprehensive account of the structures concerned for both the algae and fungi. The 2d section has 2 chapters devoted to cell division, and 1 to a consideration of the cell as a whole. The 3d section, covering the comparative organography of the lower plants, sets up a series of types of plant body and proposes an elaborate new nomenclature for the various types. In it the plant bodies are analyzed according to their fundamental organization and are placed in 3 major categories. The 1st of these, the Nematoblasts, includes all those in which the plant body is resolvable to a single filament. The 2d, the Siphonoblasts, includes all those with a siphonaceous type of plant body. The 3d group, the Syngamata, includes all in which the plant body consists of several or many filaments. It is the equivalent of Oltmann's "fountain type" of thallus. The concluding section is devoted to comparative anatomy, and discusses the cortical system, the storage system, the medullary system, and the mechanical system of the thallus.—G. M. Smith (courtesy Bot. Gaz.).
6333. TAFT, CLARENCE E. Additions to the algae of Michigan. Bull. Torrey Bot. Club 66(2): 77-85. 12 fig. 1939.

—Reports 147 new state records, with 1 new sp. and a n. var. in Oedogonium.—C. E. Tajt.

6334. TSENG, C. K. Notes on some Chinese marine algae. Linguan Sci. Jour. 17(8): 591-604. 1938.

6335. YONEDA, YÜICHI. Thermal and sub-thermal Cyanophycean algae from Beppu. Acta Phytotax. et Geobot. [In Jap. with Eng. summ.] 7(4): 213-221. 1938.—

Lists 27 genera and 77 spp. in these chemically divergent. Lists 27 genera and 77 spp. in these chemically divergent, mostly simple or carburetted hot springs. Mastigocladus and *Phormidium* occur most abundantly with numerous species of *Oscillatoria*. The range of acidity is pH 5-9.2, the optimum for growth being pH 6-7, most species being restricted to a range of 2 units or less. Some species endure a wide temp. variation but 30-50° is the optimum. Certain normally tropical spp. are found here. E. H. Walker.

FUNGI

Editor: C. L. SHEAR. Associate Editor: EDITH K. CASH

(See also in this issue Entries 5289, 5313, 5389, 6046, 6205, 6269, 6308, 6329, 6332, 6572, 6594, 6628, 6642, 6658)

FUNGI

6336. BACKUS, MYRON P. The mechanics of conidial fertilization in Neurospora sitophila. Bull. Torrey Bot. Club 66(2): 63-76. 4 pl., 1 fig. 1939.—When ungerminated condia of the appropriate reaction were placed on the surfaces of plate cultures of N. sitophila, the conidia were seen to fuse with terminal portions of long trichogynes which originate from a fertile coil within the solerotial bodies (incipient perithecia). The major portion of the conidial protoplast enters the trichogyne via a narrow cytoplasmic connection, and shortly thereafter the sclerotial body is transformed into a parithenium. Only 1 positionium body is transformed into a perithecium. Only 1 perithecium matures for each 4 or 5 conidia introduced. Germinating conidia or ascospores were also demonstrated to be effective fertilizing agents, and trichogynes were observed attached to the germ tubes. A single germinated spore may induce the formation of a cluster of perithecia. Trichogynes from a number of sclerotial bodies may perhaps receive nuclei

from a dwarf mycelium formed from a germinated spore placed on the surface of a culture of the opposite reaction.— M. P. Backus.

6337. BAVENDAMM, W., und H. REICHELT. Die Abhängigkeit des Wachstums holzzersetzender Pilze vom Wassergehalt des Nährsubstrates. Arch. Mikrobiol. 9(5): 486-544. 12 fig. 1938.—The rate of development of a number of wood destroying fungi on malt agar plates and in wood was detd. as a function of relative humidity. Various relative humidities were obtained by the use of salt solns. The fungi fall into 2 groups: those that will not grow below 90.4% relative humidity and those that grow down to 85.6%. Stereum frustulosum was the only organism growing at 81.5% rel. humidity. The opt. humidity for all organisms was somewhat below saturation (90.4-99%). The significance of the results in relation to practical wood preservation is discussed.—H. A. Barker.

6338. BEYMA thoe KINGMA, F. H. van. Beschreibung

einer neuer Pilzarten aus dem "Centraalbureau voor Schimmelcultures" Baarn (Holland). Zentralbl. Bakt. II. Abt. 99(18/23): 381-394. 6 fig. 1939.—Margarinomyces luteo-viridis* from butter, Switzerland, and oleomargarine, Czechoslovakia; M. fasciculatus* and M. hoffmannii* from butter, Switzerland; Tilachlidium butyri* from butter, Denmark; Scopulariopsis danica* from skin disease of horse, Denmark; and Penicillium humuli* from Humulus lupulus, Germany.

6339. BOUSSET, M. À propos de Clitocybe rivulosa Fr. et de quelques confusions possibles. Bull. Trimestr. Soc. Mycol. France 54(2 pt. 3): 12-14. 1938.—Differences between C. rivulosa and Rhodopaxillus nimbatus are tabulated.—W A. Jenkins.
6340. CASTELLI, T. Nuovi blastomiceti isolati da

mosti del Chianti e zone limitrofe. [New yeasts isolated from must on Chianti and surroundings.] Arch. Mikrobiol. 9(4): 449-468. 11 fig. 1938.—A number of new spp. and vars. of yeasts are described: Saccharomyces italicus, Sacch. ellipsoideus var. major, Sacch. oviformis var. bisporus, Zygosaccharomyces florentinus and Zygopichia chiantigiana. -H. A. Barker

6341. DRECHSLER, CHARLES. New Zoopagaceae capturing and consuming soil Amoebae. Mycologia 30(2): 137-157. 4 fig. 1938.—In addition to the 4 new spp. here presented (2 of Zoopage and one each of Stylopage and Acaulopage), 30 spp. are described in the ZOOPAGACEAE, which is here fully described as a new family.—F. V. Rand

(courtesy of Exp. Sta. Rec.).
6342. IMLER, LOUIS. Notice pour les mycophiles. Coprinus micaceus et Coprinus tergiversans. Bull. Trimestr. Soc. Mycol. France 54(2, pt. 3): 9-10. 1938.—Distinguishing features of the 2 species given in tabular form. W. A.

6343. IMLER, LOUIS. Coprinus bouderi Quélet, croissant en fascicules sur l'écorce pourrisante d'un hêtre vivant. Bull. Trimestr. Soc. Mycol. France 54(2): 122-126. 1 pl., 2 fig. 1938.—C. bouderi*, here descr., was found growing on the decaying bark of an old beech tree.—W. A. Jenkins.

6344. JOSSERAND, MARCEL. Description de Coprinus bouderi Q. Bull. Trimestr. Soc. Mycol. France 54(2): 127-

131. 1 fig. 1938.

6345. KERN, F. D. Additions to the Uredinales of Venezuela. Mycologia 30(5): 537-552. 1938.—Includes species of Aecidium, Chrysocyclus, Maravalia, Phakopsora, Prospodium (1 n. sp.), Puccinia (1 n. nom., 2 n. spp.), Uredo (1 n. sp.), and Uromyces.—Courtesy Exp. Sta. Rec. 6346. LIENEMAN, C. Observations on Thyronectria denigrata. Mycologia 30(5): 494-511. 47 fig. 1938.—This fungus, on Gleditsia, is described from the morphological and developmental standardius and its validity as a distinct

and developmental standpoints, and its validity as a distinct

species is questioned.—Courtesy Exp. Sta. Rec.
6347. MAINS, E. B. Studies in the Uredinales, the genus Chaconia. Bull. Torrey Bot. Club 65(9): 625-629.
6 fig. 1938.—The genus and 2 recognized spp., C. alutacea*
Juel and C. butleri* (p.628) (Blastospora b. Syd.), are redescribed and their relationship to other genera of the Pucciniaceae is discussed. Maravalia albescens Syd. is reduced to synonymy under C. alutacea. C. texensis is excluded.—E. B. Mains.

5348. MAINS, E. B. Studies in the Uredinales, the genus Maravalia. Bull. Torrey Bot. Club 66(3): 173-179. 1939.—A critical revision of the genus, with descriptions, synonymic lists, etc. of the recognized species. Argomycetella is sunk in synonymy under M. One species is transferred to M. from Uromyces and 2 from Poliotelium.—

 $\pmb{E}.\;\pmb{B}.\;\pmb{Mains}.$

6349. MAUBLANC, A., et L. ROGER. Sur deux espèces du genre Cookeina en Afrique. Bull. Trimestr. Soc. Mycol. France 54(2): 111-115. 1938.—A few additional notes (with synonymy) are given for C. sulcipes* and C. tricholoma*. W. A. Jenkins.

6350. MILLER, J. H. Studies in the development of two Myriangium species and the systematic position of the order Myriangiales. Mycologia 30(2): 158-181. 4 fig. 1938.— The characters of M. duriaei and M. curtisii have been studied in serial sections. The ascal locule cannot be homologized with the locule in the Pseudosphaeriales nor in the Dothideales, because the interthecial tissue is ontogenetically different in each case. The globose asci, arising from lateral or terminal positions on the ascogenous hyphae, and being separated by these hyphae at different levels, are all characters which indicate a close Plectascales relation-

ship.-From auth. summ.

6351. MIX, A. J. New species of Taphrina and new records from western North America. Amer. Jour. Bot. 25(1): 44-48. 2 fig. 1939.—T. amelanchieri on Amelanchieri alnifolia, from California; T. boycei on Betula fontinalis and B. occidentalis, British Columbia; T. flectans on Prunus emarginata, California. A new host-record is the occurrence of T. aurea on Salix laevigata, California. T. farlowii Sadeb. (= Expascus varius Atk.).-A. J. Mix.

6352. MOYNOT, M. À propos Clitocybe dealbata et cerussata. Bull. Trimestr. Soc. Mycol. France 54(2, pt. 3): 11. 1938.—A correction stating the writer had confused C. cerussata with C. prunulus.—W. A. Jenkins.

6353. MURRILL, W. A. New Florida polypores. Bull. Torrey Bot. Club 65(9): 647-661. 5 figs. 1938.—N. spp. are described in Daedalea, Pyropolyporus, Polyporus, Abortiporus, Hapalopilus, Coriolopsis, Trametes, Tyromyces, Coriolus, Fomitiporia, and Poria; n. var. in Coriolus; n. comb. in Microporellus and Aurantiporus (syn. Polyporus). The n. spp. described as Abortiporus, Coriolopsis, Hapalopilus, Trametes and Tyromyces are also named as n. combs. in Polyporus, according to the Saccardian nomenclature; those as Coriolus in Polystictus; the Fomitiporia in Poria;

and the Pyropolyporus in Fomes.

6354. NAUMOV, N. A. Clés des Mucorinées (Mucorales). Transl. from the 2nd Russian ed. with notes by the author, by S. BUCHET and I. MOURAVIEV. Preface by PIERRE ALLORGE. Encylopedie Mycologique 9. 1-137. 82 fig. With an appendix of 36pp. Paul Lechevalier: Paris, 1939.—A comprehensive compilation of taxonomic information on the Mucorales, arranged in the form of a key to families, genera, and species. The author subdivides the group into the 4 suborders Sporangiophoreae, Choanephoreae, Pseudoconidiophoreae, and Conidiophoreae. The first includes the families Mucoraceae, Pilobolaceae, and Mortierellaceae, the 2d the Choanephoraceae, the 3d the Syncephalastraceae and Cephalidaceae, and the 4th the Cunninghamellaceae and Spinaliaceae. 38 genera are recognized, including PROTO-ABSIDIA based on Absidia blakesleana Lendner. He recognizes such genera as Actinomucor, Hildebrandiella, Parasitella, Proabsidia, Spinalia, Sigmoideomyces, and Thamnocephalis. He gives generic rank to the 3 well known sections of Thamnidium, and places Chaetocladium with them to form the tribe Thamnideae of the Mucoraceae. Dicranophora and Sporodinia constitute the tribe Sporodineae of the same family; Spinellus and Phycomyces comprise yet another tribe. Syncephalastrum constitutes a family adjacent to the Cephalidaceae which includes Syncephalis, Piptocephalis, and Dispira. An attempt is made to include all known spp. Mucor contains approx. 80 spp. arranged in 13 named sections. About a dozen new spp. are described in Mucor, Zygorhynchus, Lichtheimia, Ticghemella, Dicranophora, Syncephalis, Rhizopus, and Cunninghamella. An introductory general discussion of the order with emphasis placed on types of fructification, is followed by an empirical key to genera, and this by a detailed key to spp. which accomplishes a rather full description of each entity. Reference is made to the place of publication of the original description of each, and a complete bibliography is provided. Also there is given an alphabetical list of all known names of genera, spp., and vars., including synonyms and rejected names. As the Russian 2d edition, of which this is a translation, appeared at approx. the same time as the treatise on the same subject by H. Zycha in Kryptogameflora der Mark Brandenburg, the author and his translators have provided a lengthy appendix in which the contributions of Zycha are incorporated and evaluated. In addition to many comments on individual species, his treatment of the Endogonaceae as a family of the order is included. Finally a list of all spp. of the order, exclusive of the Endogonaceae, in which the sexual stage has been observed is given.-Considerable material not included in the Russian edition is incorporated by the author in the translation.—H. M. Fitzpatrick.

6355. NICOLAS, G., et Mile. AGGERY. Sur un Peronosporacée parasite de "Rhinanthus Crista-galli" L. Bull.

Trimestr. Soc. Mycol. France 54(2): 115-121. 1938.—A few additional notes given for Peronoplasmopara densa* and a brief characterization of the symptoms it causes on R. crista-

galli.—W. A. Jenkins.

6356. SINGER, R. Contribution à l'étude des Russules. 3. Quelques Russules americaines et asiatiques. Bull. Trimestr. Soc. Mycol. France 54(2): 132-177. 1938.—A descriptive list, with several nomenclatorial changes and descr. of new spp., from Washington (D. C.) (3), Altai Mts. (2), Caucasus (5), Siberia (2), Oregon (1), and Tian Shan Mts. (1). Keys are given to the Stirpe R. fellea and forms of R. sphagnophila. Tables of reactions to FeSO₄ are also given as well as a floristic supplement which lists all species discussed according to geographical distribution. A

phylogenetic chart is appended.—W. A. Jenkins.
6357. STILLINGER, C. R. Distribution, hosts and internal telia of Puccinia parkerae. Mycologia 30(2): 235-242. 2 fig. 1938.—The distr. of this rust is extended to eastern Washington State, northern Idaho, and British Columbia. It is primarily specialized on *Ribes lacustre*, and R. bracteosum, R. sanguineum, and Grossularia divaricata are reported as new hosts. Internal telia were found in the fruit and stem of R. lacustre, stem and fruit infection of the host being reported for the first time.—F. V. Rand

(courtesy of Exp. Sta. Rec.).

6358. SWOBODA, F. Zur Anatomie der Lycoperdaceen. I. Lycoperdon marginatum Vitt. Ann. Mycologici 36(2/3):

95-118. Illus. 1938.

6359. SWOBODA, F. Studien zur Gattung Lactarius Fr. I. Lactarius zonarius Bull. ex Fr. und Lactarius flexuosus

Pers. ex Fr. Ann. Mycologici 36(2/3): 119-127. 1938. 6360. WINDISCH, S. Zur Kenntnis der Askosporen-bildung bei Torulopsis pulcherrima (Lindner) Sacc. Arch. Mikrobiol. 9(5): 551-554. 1938.—Heterogamic copulation by T. pulcherrima was observed on old, partially dried-up maltose agar. An ascus with 4 spores was formed. The germination of the spores was observed.—H. A. Barker.

MYXOMYCETES

6361. KAMBLY, PAUL E. Some physiological characteristics of Myxomycete swarm-cells. Amer. Jour. Bot. 26(2): 88-92. 1939.—The swarm-cells of Reticularia lycoperdon, which are haploid but do not fuse until after several mitotic divisions, were placed in vital stains, pH indicators, oxidation-reduction indicators, and in certain toxic compounds. Reactions of swarm-cells of different ages gave no evidence of physiological differences associated with the ability to fuse. The surface charge of swarm-cells in distilled water, determined by migration in an electrical field, was found to be uniformly negative. These results were confirmed with Enteridium rozeanum, Stemonitis

webberi and Fuligo septica.—P. E. Kambly.
6362. RAPER, KENNETH B. Influence of culture conditions upon the growth and development of Dictyostelium discoideum. Jour. Agric. Res. 58(3): 157-198. 5 fig. 1939.— D. discoideum was grown in association with Escherichia coli and Pseudomonas fluorescens upon media containing different quantities of peptone accompanied by some sugar. Good growth of the slime mold occurred where the peptone and the carbohydrate were simultaneously fermented by the bacteria, but not where the peptone alone was broken down. The presence of good growth was correlated with the pH of the bacterial colonies; the optimum reaction was pH 6; pH 5 to 7 constituted a favorable range. Colonies of bacteria had to be of a favorable physical character for D. discoideum to thrive. The myxamoebae could not feed effectively upon gum-encased bacterial cells. A more nearly optimum environment was required for the organization of myxamoebae into fruiting structures than for their vegetative growth.—K. B. Raper.

LICHENES

6363. DEGELIUS. GUNNAR. Lichens from Southern Alaska and the Aleutian Islands, collected by Dr. E. Hulten. Meddel. Göteborgs Bot. Trädgard 12: 105-144. 4 pl., 5 fig. 1937(1938).—This is a revision of Hulten's collection of lichens made in 1932. Cladonia graciliformis, Physcia $constipata, \ Stereocaulon \ intermedium, \ and \ Perforaria, \ are new to N. America.$

6364. DODGE, CARROLL W., and GLADYS E. BAKER. The second Byrd Antarctic Expedition—Botany. II. Lichens and lichen parasites. Ann. Missouri Bot. Gard. 25(2): 515-718. 27 pl. 1938.—From a collection of specimens from Marie Byrd Land, King Edward VII Land, and Queen Maud Mis. new spp. were described in the following genera: Thelidium, Lecidea, Catillaria, Rhizocarpon, Biatorella, Sarcogyne, Umbilicaria, Lecanora, Candelariella, Panno-Sarcogyne, Umbilicaria, Lecanora, Candelarieua, Launo-parmelia, Parmelia, Alectoria, Usnea, Protoblastenia, Blas-tenia, Kuttlingeria, HUEA (Blasteniaceae), Pyrenodesmia, Gasparrinia, Polycauliona, Buellia, Rinodina, Diplonaevia, Candelia, Parmelia variolosa D. (D. parmeliae D. & B. n. sp.; host: Parmelia variolosa D. & B.). New combinations in Omphalodium, Lecanora, Huea, Xanthoria, Gasparrinia.—F. R. Fosberg.
6365. ERICHSEN, C. F. E. Neue Beiträge (3) zur Kenntnis der Flechtenslora Schleswig-Holsteins und des

Gebiets der Unterelbe. Ann. Mycologici 36(2/3): 128-153.

Fosberg.

6366. EVANS, ALEXANDER W. The Cladoniae of New Jersey-Supplement. Torreya 38(6): 1938.—Brings the report of collections down to 1937. Includes extensive collections of Mr. Raymond H. Torrey.—M. A. Rice.

6367. GEITLER, LOTHAR v. Die Flechten- und Algenflora des Lunzer Sándsteins. Internat. Rev. ges. Hydrobiol. u. Hydrogr. 37(4/5): 445-447. 1938.—The contrast in the growths on limestone and on rocks poor in lime is exemplified in the district of Lunz, where a standstone ridge occurs in the Mesozoic limestone. The Lunz sandstone is typically a lime-free stone, colonized by calcifuge lichens and algae. It belongs to the lower Upper Triassic, and is well known for its plant fossils. Freshly broken surfaces have 0.1% of lime, but weathered surfaces have none. It is a lime-free siliceous stone. Typical Lunz standstone lacks the following lichens richly developed on limestone:—Verrucaria calciseda, V. acrotella, V. nigricans, Gyalecta cupularis, Petractis clausa, Protoblastenia rupestris, Placynthium nigrum, Col-lema melaenum. Also without exception the typical bluegreen algae of limestone, Gloeocapsa alpina, and Scytonema myochrous, are lacking. Instead are the typical silicate-encrusting lichens, Lecidea crustulata var. subconcentrica, Lecanora coarctata, and the wide-spreading, overwhelming Baeomyces byssoides, which is otherwise completely lacking in the district. The algae are Gloeocapsa magma, developed in sunny places as var. simmeri, which is only on old shingle roofs and as a colonizer of primitive rocks poor in lime, and Stigonema minutum, always on acid substrate, Scytonema hoffmanni, and of the Chlorophycean Trentepohlia aurea. In shaded places some unnamed Protococcaceae appear singly (Stichococcus et al.), which do not appear on limestone. In comparison with the growth of lichens on siliceous rocks in the Central Alps there is a quantitative and qualitative poverty of species; often large surfaces are entirely without growths. The difference between the sandstone and limestone flora is striking in the district of Stellen. On the slopes of the meadows one finds single sandstone boulders rolled down from above, with their typical growths, although such are lacking in their surroundings for a wide distance. The 2 floras are also well developed in close proximity on the slopes of the street at the head of the lake, which is partly walled with limestone and partly with sandstone.—A. W. C. T. Herre.

6368. JOHNSON, GEORGE THOMAS. The taxonomic

importance and phylogenetic significance of the cephalodia of Stereocaulon. Ann. Missouri Bot. Gard. 25(3): 729-768. 2 pl. 1938.—The author concludes that the gross morphology of the cephalodium is a good taxonomic character in Stereocaulon (Lichenes-Cladoniaceae), and constructs a phylogenetic arrangement of the genus based upon it. He also presents a tentative phylogenetic scheme showing re-lationships within the Cladoniaceae. He concludes, further, that the species of alga in the cephalodium is of no taxonomic significance, and that the cephalodium is not a pathologic structure, but seems beneficial to the entire lichen. Its physiological significance is unknown.—F. R.

BRYOPHYTA

A. LEROY ANDREWS, Editor

6369. BARTRAM, EDWIN B. The Second Byrd Antarctic Expedition—Botany. III. Mosses. Ann. Missouri Bot. Gard. 25(2): 719-724. 1938.—From Marie Byrd Land and King Edward VII Land 5 spp. in Sarconeurum, Barbula (n. sp.), Grimmia (n. vars.), Bryum (n. sp.).—F. R. Fosberg.
6370. CLEE, D. A. The morphology and anatomy of

Pellia epiphylla considered in relation to the mechanism of absorption and conduction of water. Ann. Botany 3(1): 105-111. 4 fig. 1939.—This liverwort is shown to obtain supplies of water the gametophyte in the form of surface supplies the supplies of water the gametophyte in the form of surface supplies the supplies of water the supplies of wa films which travel rapidly over the entire plant from the moist substratum, and which completely bathe it. Absorption of water is therefore not localized, but occurs over the whole surface of the plant, while internal conduction of water is very limited and localized. This external water surrounds the sex organs, passes rapidly down the neck of the archegonium and supplies the egg before and after fertilization. During development of the sporophyte it even surrounds and is rapidly absorbed by the foot, thus rendering the sporophyte largely independent of the gametophyte for supplies of water and mineral salts.—D. A. Clee. 6371. REIMERS, H. Über zwei systematisch und geo-

graphisch interessante Laubmoose des Mediterrangebietes (Plagiothecium argyrophyllum und Isopterygium bottinii). Hedwigia 77(5/6): 243-260. 1938.

6372. STEERE, WILLIAM CAMPBELL. Barbula in North America north of Mexico. Bull. Torrey Bot. Club 66(2): 93-119. 1939.—68 spp. of Barbula which have been either reported or described as new from N. America north of Mexico are discussed, in alphabetical order. The taxonomic and nomenclatorial status of each species is analyzed, and the great majority are reduced to synonymy, leaving a residue of 19 spp. to be recognized within the range of Grout's "Moss Flora of North America, north of Mexico." Some of the causes of the confused conditions in the genus Barbula, in the past, are discussed, and a list is given of 19 spp., originally descr. as Barbula, which actually belong in

Tortula.—W. C. Steere.
6373. TOYAMA, REIZO. Pylaisiae japonicae. Acta
Phytotax. et Geobot. [In Ger. with Jap. résumé] 7(4): 222-235. 7 fig. 1938.—A systematic treatment of Pylaisia (Musci) recognizing 7 spp., including 3 new spp. with some new forms.—E. H. Walker.

PTERIDOPHYTA

C. A. WEATHERBY, Editor

(See also in this issue Entries 5306, 6430)

6374. HÄRTEL, KURT. Studien an Vegetationspunkten einheimischer Lycopodien. Beitr. Biol. Pflanzen 25(2): 9-168. 44 fig. 1938.—The apical meristems of Lycopodium complanatum, L. alpinum, L. annotinum and L. selago are descr. Additional descriptions of tissue differentiation in the axis, the development of leaves, and the branching of the stem are given in detail for *L. complanatum*. In these spp. neither apical cells (Nägeli, Hofmeister, and Van Tieghem) nor vertically seriated groups of initials (Hegelmaier) occur, but in each case the apical meristem consists of a single terminal group of initials. This group of initials corresponds to the groups found in the corresponds to the corpus found in angiosperms, but a tunica is lacking. The leaf arises from the outer several layers of cells near the apex of the stem. Branching in L. complanatum is dichotomous.—G. L. Cross.

6375. SARBADHIKARI, P. C. Cytology of apogamy and apospory in Osmunda javanica Bl. Ann. Botany 3(1): 137145. 1 pl., 4 fig. 1939.—Material was obtained in Ceylon. Prothallia arise aposporously from the surface or edge of a leaf pinnule and they show usually a vascular strand throughout the major part of their length. These prothallia produce antheridia with normal antherozoids but no archegonia. The embryo arises apogamously as a direct vegetative outgrowth from the aposporous prothallium. There is no reduction of chromosomes in the transition from the sporophyte to the gametophyte.-V. H. Blackman.

6376. SMALL, J. K. Ferns of the southeastern states. Descriptions of the fern-plants growing naturally in the states south of the Virginia-Kentucky state line and east of the Mississippi river. 517p. Science Press: Lancaster, Pa., 1938.—Osmundopteris, n. gen. (Botrychium § O. Milde); new species and combinations in Asplenium, Thelypteris, Dryopteris, Ophioglossum, Pycnodoria, Osmundopteris and Diplostachyum.

SPERMATOPHYTA

FRANCIS W. PENNELL, Editor

(See also in this issue Entries 5266, 5268, 5286, 5291, 5366, 5372, 5447, 6448, 6449, 6492)

GENERAL

6377. HOWELL, J. T. A collection of Douglas' western American plants. VI. Leaflets of Western Botany 2(9): 170-174. 1939.—Continuation of a series of notes on a duplicate collection, now at Petrograd, of David Douglas' North American plants.—L. Constance.

GYMNOSPERMAE

6378. EMBERGER, L. Contribution à la connaissance des cèdres et en particulier du deodar et du cèdre de l'Atlas.
Rev. Bot. Appl. 18(198): 77-92. 1938.—Cedrus deodora, C.
brevifolia, C. libanotica, C. atlantica.
6379. MAY, VALERIE. An albino-form of Macrozamia
spiralis Mig. Proc. Linn. Soc. N. S. Wales 63(3/4): 224-225.

2 fig. 1938.—In a colony of about 40 young individuals surrounding a 2 plant of *M. spiralis*, 2 were white. It is suggested that in this instance albinism is the result of a mutation.—V. May.

6380. NEWCOMER, EARL H. Pollen longevity of Ginkgo.

Bull. Torrey Bot. Club 66(2): 121-123. 4 fig. 1939.—Pollen collected in the Spring of 1937 and stored in a desiccator over CaCl. at 7°C retained its viability for a period of

nearly 16 months, as demonstrated by the development of normal fruits. All efforts to germinate the fresh or stored pollen in the laboratory were unsuccessful. Pollination in the latitude of central Pennsylvania normally occurs between May 2 and May 15 and fertilization between Sept. 5 and 20 for G. biloba.—E. H. Newcomer.

SPERMATOPHYTA (MIXED)

6381. PALMER, ERNEST J., and JULIAN A. STEYER-MARK. New varieties and forms from Missouri. Ann. Missouri Bot. Gard. 25(3): 769-773. 1938.—A new var. in Ludvigia; new forms in Taxodium, Salix, Carya, Quercus, Cardamine, Amelanchier and Sambucus.—F. R. Fosberg.

ANGIOSPERMAE (MIXED)

6382. KANEHIRA, RYÖZÖ. New or noteworthy trees from Micronesia. XX. Bot. Mag. [Tokyo] 52(617): 235-241. 4 fig. 1938.—Critical notes on various spp., none descr. as new. Abstracted in Japanese, p.270-271.—E. H. Walker.

MONOCOTYLEDONES

6383. CHEVALIER, A. Les palmiers Hyphaene et Borassus de l'Afrique Occidentale. Rev. Bot. Appl. 18(198): 93-

103. Illus. 1938.—Hyphaene et Borassus du Soudan français [H. thebaïca var. occidentalis (doum palm), B. aethiopum var. senegalensis (ronier)], by R. Dubois; Une nouvelle variété de Borassus aethiopum [var. domestica], by A. Chevalier.—Courtesy Pl. Sci. Lit.

6384. EASTWOOD, A. New species in Liliaceae. Leaflets of Western Botany 2(7): 109-112, 1938.—New spp. in Allium, Brodiaea and Fritillaria from California.—L. Constance.

6385. FRIEDRICH, A. M. Paraguayische Orchideen. Vier seltene Varietäten von Oncidium jonesianum. Möller's Deut.

Gärtnerztg. 53(29): 337-338. Illus. 1938.
6386. HOOVER, ROBERT F. A definition of the genus Brodiaea. Bull. Torrey Bot. Club 66(3): 161-166. 1939.—On the basis of extensive study of herbarium material and fresh plants, the genus Brodiaea is defined so as to exclude all South American species. The N. American spp. cusan special species. The N. American spp. customarily referred to that genus are treated as constituting 3 genera: *Brodiaca*, *Dichelostemma*, and *Triteleia*. These genera are separated by well-defined differences in flower, seed, and vegetative characters.—R. F. Hoover.

6386A. KNUTH, R. Dioscoreaceae uruguayenses. Rev. Sudamer. Bot. 5(3/4): 73-74. 1938.
6387. KOIDZUMI, GENITI. Bambusaceae novae japonicae. VI. Acta Phytotax. et Geobot. 7(4): 252-260. 1938.— New spp., vars. and combinations of Arundinaria and Sasa. —E. H. Walker.

6388. KOIDZUMI, GENITI. Sasa capillaris Nakai. Acta Phytotax. et Geobot. [In Jap.] 7(4): 263. 1938.—A brief critical note.—E. H. Walker.

6389. KOIDZUMI, GENITI. Sasa pseudonana Nakai. Acta Phytotax. et Geobot. [In Jap.] 7(4): 263. 1938.—A brief critical note.—E. H. Walker.

6390. McGIVNEY, SISTER M. VINCENT. A revision of the subgenus Eucyperus found in the United States. Contr. Biol. Lab. Catholic Univ. Amer. 26, 1-74, 11 pl. 1938.—A previous revision of this group was made in 1886 by Britton. The present revision, based upon more than 15,000 specimens borrowed from 27 institutions, uses numerous accurate measurements, especially in cases where size has been considered as a specific character. Such characters and dimensions are listed in 90 parallel columns to establish the identity or non-identity of spp. and vars. 31 spp. are minutely described and uniformly figured as regards spikelet, glume (scale), wing of rhachilla, stamen and achene. Cyperus pilosus Vahl and C. oxylepis Nees are reported for the first time in U.S. Full synonymy is given. An accurate, artificial key is included embodying many original features.—H. T. O'Neill.

6391. MERRILL, E. D., and F. P. METCALF. A new species of Boottia from Hainan. Lingnan Sci. Jour. 17:

567-570. 1938.

567-570. 1938.
6392. RUPP, H. M. R. A new Sarcochilus (Orchidaceae) from the Dorrigo. Proc. Linn. Soc. N. S. Wales 63(3/4): 128. 1 fig. 1938.—A new species, S. harriganae, having affinities with S. falcatus, S. olivaceus and S. spathulatus, is described from Dorrigo, N.S.W.—H. M. R. Rupp.
6393. STACEY, J. W. Notes on Carex. XIV. Leaflets of Western Botany 2(8): 121-124. 1938.—New records and two new species in Carex from Oregon and Washington.—L. Constance.

L. Constance.

6394. STACEY, J. W. Notes on Carex. XV. Leaflets of Western Botany 2(9): 166-169. 1939.—Two new spp. from California; with keys to North American species of sections Foetidae and Callistachys.—L. Constance.

6395. WHEELER, L. C. Imperata Hookeri Rupr., illegitimate! Leaslets of Western Botany 2(9): 145-146. 1939.—To be replaced by I. brevifolia Vasey.—L. Constance.

DICOTYLEDONES

6396. BUINING, A. F. H. Rebutieae. A. V. Fric en K. Kreuzinger. 3. Sleutel der geslachten. Succulenta 20(4): 53-55. 1938.

6397. COWAN, J. M. Concerning the genus Cyananthus. New Flora and Silva 10(2): 108-115. 3 pl. 1938.

6398. DANDY, J. E., and A. W. EXELL. On the nomenclature of three species of Caesalpinia. Jour. Bot. 76(906): 175-180. 1938.—C. crista, C. bonduc, C. major (comb. nov.). 6399. EASTWOOD, A. Two new Scrophulariaceae. Leastets of Western Botany 2(6): 104. 1938.—New spp. in Castilleja and Orthocarpus from California.—L. Constance.

6400. EASTWOOD, A. The yellow-flowered perennial lupines of the Pacific states. Leaflets of Western Botany 2(8): 125-128. 1938.—Two new species of Lupinus from

California.—L. Constance. 6401. EASTWOOD, A. A new variety of Delphinium californicum. Leaflets of Western Botany 2(8): 137-138.

1938.—From California.

6402. EASTWOOD, A. Perennial lupines of the Pacific states. Leaflets of Western Botany 2(9): 146-156. 1939.— A key and descriptions of the lupines comprising section Polyphyllii, of California and the Pacific northwest.—L. Constance.

6403. EASTWOOD, A. A new Phlox from Oregon.

Leaflets of Western Botany 2(9): 175. 1939.
6404. EPLING, CARL. Notes on the Scutellariae of Eastern North America. I. Amer. Jour. Bot. 26(1): 17-24. Eastern North America. 1. Amer. Jour. Bot. 20(1): 11-24.
5 fig. 1939.—The species of sections Galericularia and Lateriflorae of eastern N. America are descr. and their known ranges pictured. Two new spp. of Scutellaria are proposed, for former vars.—C. Epling.
6405. FOSBERG, F. R. [given as Fosberg, L. by mistake]. Additional note on Queensland Ixoras. Jour. Bot. 76(909): 276-277. 1938.—Taxonomic note. Mature fruit of Jara biflora Fosberg described and 2 new years of this

of Ixora biflora Fosberg described, and 2 new vars. of this species proposed.—F. R. Fosberg.
6406. GREENMAN, J. M. Studies in South American Senecios. II. Ann. Missouri Bot. Gard. 25(4): 795-822.

1938.—New species, new names, new varieties, and interpretations of previously known species.—F. R. Fosberg.
6407. HAGLUND, GUSTAF E. Bidrag till Kännedomen om Skandinaviens Taraxacum-flora. II. [Contributions on the Scandinavian Taraxacum flora. II.] Bot. Notiser 1938

(6): 499-508. 1938.—Eight n. spp. 6408. HERRE, H. A new and very rich flowering Cheiridopsis. Desert [Pasadena] 10(8): 147. Illus. 1938. 6409. HOTTA, TEIKICHI. Contributions to the knowledge of the systematics of Morus in Japan. XII. Bot. Mag. [Tokyo] 52(617): 248-255. 2 fig. 1938.—A systematic treatment of 5 species with a few new vars. and a key.— E. H. Walker.

6410. HOWELL, J. T. A new species of Penstemon. Leaflets of Western Botany 2(7): 119-120. 1938.—From California.

6411. HOWELL, J. T. A new species of Eriogonum. Leaflets of Western Botany 2(8): 133-134. 1938.—From California.

6412. HOWELL, J. T. Studies in Ceanothus. I. Leaflets of Western Botany 2(9): 159-165. 1939.—Two new spp. of Ceanothus from California.—L. Constance.

6413. ILIEN, GÖSTA. Utbredningen av Rubus sprengelii Wh. i Skane. 1907-1937. [The distribution of R. sprengelii Wh. in Scania, 1907 to 1937.] Bot. Notiser 1938(6): 509-514. 2 fig. 1938.—During the 30-year interval, this species has spread greatly. Dissemination has undoubtedly been by birds and the plant has been spared because of its useful berries. Habitat and other ecological data are given. -T R. Swanback.

6414. KIMURA, A. Symbolae iteologicae. V. Sci. Repts.

Tôhoku Imp. Univ. Ser. 4 13(1): 71-83. 4 pl. 1938.
6415. KIMURA, SIRO. Les Cacalia du Japon. Acta
Phytotax. et Geobot. [In Jap.] 7(4): 236-251. 1938.—A systematic treatment recognizing 19 spp. and C. koidzumiana, a natural hybrid. Includes also keys, a new section, transfers and a list of excluded spp.—E. H. Walker.

6417. LINDINGER, L. Über Crassula johannis-winkleri sp. n. und ihre Verwandten. Kakteenkunde 1938(10): 109-

110. 1938.

6418. LUCKHOFF, C. Some new Stapelieae. II. "S.A.G." (Cape Town) 29(2): 91-94. 2 pl. 1938.—Stapelia peculiaris,

Caralluma aurea, C. reflexa, and C. virescens.

6418A. METCALF, FRANKLIN P. Geographical distribution of Acer (section Integrifolia Pax) in China. Lingman Sci. Jour. 17: 609-614. 1938.—These spp. are decidedly western and southern in their distribution. Only A. oblongum and A. discolor have a northerly distribution. There is a center of distribution in the SW provinces and another in the SE provinces. A circle diagram shows the distr. of the spp. of this section of Acer in all the provinces of China.—J. A. Trent.

6419. METCALF, FRANKLIN P. A new Rhamnus from Kwangtung. Lingnan Sci. Jour. 17: 615-616. 1938. 6420. MORI, SYUITI. Classification of Japanese Pisidium. Mem. Coll. Sci. Kyoto Imp. Univ. Ser. B 14 (2): 255-278 5 n. 1032. Alterather 12 spn. and 11 subserve. (2): 255-278. 5 pl. 1938.—Altogether 13 spp. and 11 subspp. including 6 new spp. and 8 new subspp. collected from Tisima, Karahuto, Hokkaidô, Honsyû, Kyûsyû and Okinawa are described with illustrations.—T. Komai.

6421. MUNZ, P. A. Interesting western plants. II. Leaflets of Western Botany 2(6): 87-89. 1938.—New spp. and vars, in Oenothera from California .- L. Constance.

6422. MUNZ, P. A. Interesting western plants. IV. Leaflets of Western Botany 2(9): 156-158. 1939.—A new sp., a new var. and a new comb. in *Oenothera*, involving plants of Mexico and Arizona.—L. Constance.

6423. PILAR RODRIGO, A. del. Sinopsis de las mal-

váceas bonarienses. Revista Argentina Agron. 5(2): 87-102.

váceas bonarienses. Kevista Argentina Agron. 5(2): 81-102. Illus. 1938.—Malvaceae of Argentina.
6424. POELLNITZ, K. von. Cotyledon buchholziana Schuldt et Stephan. Kakteenkunde 1938(10): 111-112. Illus. 1938.—Is Cotyledon, not Ceraria.
6425. RIPLEY, D. Thymes of the Iberian Peninsula. New Flora and Silva 10(2): 90-94. 1 pl. 1938.—Thymus.
6426. SKOTTSBERG, C. Further notes on Vaccinium of Haweii Meddel Götchovas Rot. Trädgård. 12: 145-151.

of Hawaii. Meddel. Göteborgs Bot. Trädgård 12: 145-151. 4 fig. 1937(1938).—A revision. In taxonomical respect, this paper contains little new, but gives a better idea of the range of variation in certain forms, and several new localities.

6427. STERN, F. C. Magnolia sinensis × wilsonii. New Flora and Silva 10(2): 105-107. 1 pl. 1938.

6428. WETMORE, RALPH H., and ALBERT L. DELISLE. Studies in the genetics and cytology of two species in the genus Aster and their polymorphy in nature. Amer. Jour. Bot. 26(1): 1-12. 6 fig. 1939.—Genetical and cytological investigations in 2 spp. of Aster, their forms, and their reciprocal hybrids afford an explanation for the polymorphic complex comprised of A. multiflorus, A. novae-angliae, and the natural gradations between them. Breeding expts. have provided plants which typify the polymorphy exhibited by this group in the field. Utilizing a method by which qualitative characters are converted into quantitative numerical values, it was possible to employ the findings from known genetical material for interpretation of specimens procured in nature. This study confirmed genetical conclusions, viz., that these 2 spp. and their vars. hybridize extensively "in the wild," producing a series of variable forms ranging in morphological and cytological characters from true hybrids, through back crosses, to the type species. Thus there results a perplexing polymorphy and forms belonging to the complex have been given different names by taxonomists. Cytological studies have indicated that these 2 spp. of Aster possess a haploid chromosome complement of n=5. In the hybrid, these chromosomes exhibit remarkable affinity in the meiotic process and suggest a close phylogenetic relationship between the parents. There are 2 chromosome groups in the genus Aster, a 5— and a 9—, with a polyploid series in the latter. The differences in chromosome number between the 2 groups may act as a genetic barrier to the production of viable hybrids between spp. with 5 pairs of chromosomes and those with 9 or more pairs.—R. H. Wetmore.
6429. WOODSON, ROBERT E. Jr., and RUSSELL J.

SEIBERT. Contributions toward a Flora of Panama. II. Miscellaneous collections during 1936-1938. Ann. Missouri Bot. Gard. 25(4): 823-840. 2 fig. 1938.—New species in Crinum, Peperomia, Piper, Marathrum, Magnolia, Eurya, Begonia, Ardisia, Vincetoxicum, Conopholis, Gonzalagunia, Guettarda, Palicouria.—F. R. Fosberg.

FLORISTICS AND PLANT DISTRIBUTION

6430. BEETLE, A. A. Flowering plants and ferns of the Fox Research Forest. Caroline A. Fox Res. and Dem. Forest 9: 1-40. 1938.—New Hampshire.

6431. CHRISTOPHERSEN, ERLING. Flowering plants of Samoa. II. Bernice P. Bishop Mus. Bull. 154. 1-77. 3 pl., 21 fig. 1938.—A concluding taxonomic report on the collections of plants made by the author in Samoa in 1929 and 1931-32 and the other Samoan collections in the Bernice P.

Bishop Museum. New spp. are descr. in Cryptocarya, Weinmannia, Euodia, Cupaniopsis, Pareugenia, Syzygium, Metrosideros, Medinilla, Astronidium, Burckella, Cyrtandra, Psychotria, Sarcopygme, and Morinda. 9 (or 11) additional spp. are new records for Samoa, 11 spp. are reduced or excluded from the flora, bringing the total number of spp. of flowering plants known in Samoa to about 1023.—

E. Christophersen.

6432. DANDY, J. E., and G. TAYLOR. Studies of British Potamogetons. II. Some British records of Potamogeton trichoides. Jour. Bot. 76(906): 166-171. 1938.

6433. GOODSPEED, T. H. Andean plant hunting. II. New Flora and Silva 10(2): 75-84. 4 pl. 1938.

6434. HARA, HIROSHI. Preliminary report on the flora of southern Hidaka, Hokkaido (Yezo). XXIX. Bot. Mag. [Tokyo] 52(617): 227-234; (618): 283-290. 1938.—A critical enumeration with new vars. and forms, these parts concerning Gramineae and Bambusaceae.—E. H. Walker.

6436. PALMER, ERNEST J., and JULIAN A. STEYER-MARK. Additions, corrections, and revisions to the "Annotated Catalogue of the Flowering Plants of Missouri." Ann. Missouri Bot. Gard. 25(3): 775-794. 1938.—Extensive corrections based mainly upon taxonomic and nomen-clatorial changes in recent literature.—F. R. Fosberg.

6437. STANDLEY, PAUL C. Flora of Costa Rica. Field Mus. Nat. Hist. Bot. Ser. Publ. 429 18(4): 1137-1571. 1938. -Comprises families from Gesneriaceae with keys to genera and species, to Compositae. Gesneriaceae, by C. V. MORTON, includes new entities or names in Alloplectuus (3), Besleria (5), Campanea (1), Centrosolenia (2), Codonathe (1), Columne a (4), Drymonia (2), Kohleria (3), Monopyle (2). Acanthaceae, by E. C. LEONARD, with keys to genera and species, includes new entities or names in Applending (2), Belongroue (1), Reservacinis (1), Anne (2), Release (3), Reservacinis (1), Anne (3), Release (3), Reservacinis (3), Reservacinis (3), Release (4), Release (3), Release in Aphelandra (2), Beloperone (1), Buceragenia (1), Carlo-wrightia (1), Chamaeranthemum (1), Dicliptera (3), Dyschoriste (1), Glockeria (2), Jacobinia (1), Justicia (9), Mendoncia (1), Pseuderanthemum (2), Ruellia (2), Rubiaceae includes new entities or names in Cephaelis (1), Coussarea (2), Didymaea (2), Gonzalagunia (1), Guettarda (1), Hoffmannia (1), Ladenbergia (3), Machaonia (1), Palicourea (2), Psychotria (5), Randia (1), Rondeletia (2), Rudgea (1). Valerianaceae includes 1 new species in Valeriana. Cucurbitaceae includes new species in Cayaponia (2), Gurania (1). Lobeliaceae includes new species in Burmeistera (1), Centropogon (4). Compositae, with key to genera, includes new entities or names in Baccharis (1), Calea (1), Eupatorium (3), Liabum (1), Senecio (3). As additions appear new entities or names in *Peperomia* (11) and *Piper* (8) of the Piperaceae (by TRELEASE); in *Pilea* (1) of the Urticaceae (by Killip); in *Iresine* (1) of the Amarantaceae; in *Persea* (1) of the Lauraceae; in *Hernandia* (1) of the Hernandiaceae; in *Capparis* (1) of the Capparidaceae; in Inga (1) of the Leguminosae; in Paullinia (1) of the Sapindaceae; in Sloanea (1) of the Elaeocarpaceae; in *Rhipsalis* (1) of the Cactaceae; in *Eugenia* (1) of the Myrtaceae; in *Blakea* (1) of the Melastomaceae; in Sciadophyllum (1) of the Araliaceae (by A. C. SMITH); in Ipomoea (1) of the Convolvulaceae; and in Capsicum (1), Lycianthes (1) and Solanum (1) of the Solanaceae. A summarized tabulation, with discussion, concludes the work.—F. W. Pennell.

6438. WALAS, J. Wanderungen der Gebirgspflanzen längs der Tatra-Flüsse. Bull. Internat. Acad. Polonaise Sci. et Lettr. Cl. Sci. Math. et Nat. Sér. B: Sci. Nat. (1) [Bot.] 1938(1/5): 59-80. 2 maps, 6 pl. 1938.—Topographic and climatic features of the Tatra region are discussed in relation to migration and survival of alpine plants. Agents and periods of dispersal of propagules are correlated with adaptability of species to migration and invasion. Tables and maps show distribution of 106 spp. along migratory lines below the 1000 m. level. A brief comparison with

plant migration in alpine valleys is made.—T. L. Steiger.

6439. WEST, E. M. The vegetation of Grand Isle.

Proc. Louisiana Acad. Sci. 4: 214-217. 1938.—An ecological study of the vegetation of Grand Isle, La., which is a relatively barren area showing rapid successional changes, is presented.

MORPHOLOGY AND ANATOMY OF VASCULAR PLANTS

(See also in this issue Entries 6375, 6380, 6505, 6514, 6564, 6620, 6625, 6626)

6440. BUCHHOLZ, J. T. The morphology and embryogeny of Sequoia gigantea. Amer. Jour. Bot. 26(2): 93-101. 31 fig. 1939.—The writer describes the relation of the ovule to the cone scale, the position of the gametophytes within the nucellus, the development of the ? gametophyte, and the origin and arrangement of the archegonia. The latter are not enclosed in a complete jacket. The chromosome number in gametophytic cells is 11. The megaspore membrane is moderately developed and is $2-3\frac{1}{2}\mu$ thick. Embryogeny begins with free-nuclear division. The proembryo is organized into 3 or 4 tiers, a rosette, a prosuspensor, and an embryonic tier of 3 or 4 cells. At first it fills only the lower half of the egg, but later the rosette cells may proliferate and the entire proembryo enlarge to fill the egg. The prosuspensor elongates, thrusting the embryonic cells into the gametophyte tissue. The embryonic cells divide forming 8 or more embryo initials, each of which divides to form a primary suspensor cell and an embryonic cell. The primary suspensors elongate as the embryonic cells grow apart to form independent embryo units. The prosuspensor elongates considerably but is crushed by the primary suspensors which are soon replaced by secondary suspensors. Rosette cells may produce embryos, so that cleavage polyembryony is very extensive, each zygote producing a dozen or more embryos. At the end of the first growing season, the numerous embryos are composed of only about 12 cells each, and throughout the winter they remain undifferentiated except for the polarity of the suspensor-embryo axis. The 2d season eliminates many embryos. Only a few develop into cylindrical structures, and usually only 1 per ovule survives to form cotyledons, about 4 (3-5) of which form during July and Aug. In general, the embryogeny of S. gigantea resembles that of Sciadopitys rather than that of the other species of Sequoia. $extit{-}P. \ Cook.$

6441. CAMIN, E. Beiträge zur Anatomie der Yucca und zur Kenntnis ihrer Aufbereitungsmöglichkeiten. Faserforschung. 13(4): 214-240. 2 pl. 1938.
6442. COLIN, H. La tricotyledonie chez la Betterve.

Publ. Inst. Belge Améliorat. Betterave 6(5): 349-350. 1938. -Tricotyledony has been observed in many vars. of sugar.

beets, approx. one case in 300 seedlings. The true leaves which follow are also in 3's.—W. W. Robbins.

6443. CROSS, G. L. A note on the morphology of the deciduous shoot of Taxodium distichum. Bull. Torrey Bot. Club 66(3): 167-172. 6 fig. 1939.—The deciduous shoots are classified on a basis of time and place of origin, into several groups, viz.: those which arise exogenously in the axils of the upper scale-leaves of the expanding permanent twig, and expand with the parent twig; those which are formed pseudo-endogenously in the lower scale-leaves of the permanent twig; those which arise endogenously near the bases of the lower scale-leaves and scales of the permanent twig; and those which arise (endogenously?) in the axils of the lower scales of pre-existing deciduous

shoots. The deciduous shoots are regarded as homologous with the dwarf shoots of Pinus.—G. L. Cross.

6444. DAVIES, P. A. Leaf position in Ailanthus altissima in relation to the Fibonacci series. Amer. Jour. Bot. 26(2): 67-74. 1 fig. 1939.—The position in a phyllotaxis series appears to be a $\frac{1}{8}$ or 3:5 arrangement—that is, the mean foliar divergent angle approximates the 135° distribu-tion of the fractional series. Large variations in divergent angles occur even on the same shoot. The variation of angular divergence in 685 measurements on mature shoots, rapidly growing shoot tips, developing buds; and young seedlings was from a minimum of 113.3° to a maximum of seedings was from a minimum of 113.3 who a maximum of 165.4°, or a range of 52.1°. Mean angular divergence of 685 foliar positions was 137.686° or 137° 39′ 57″. This very closely approximates the Fibonacci or "ideal angle" of 137° 30′ 28″. The standard deviation from the mean was 8.583°. The normal phyllotaxis system has its origin in the onehalf or decussate arrangement in bud or seedling development. The normal system was established in bud develop-ment between the 7th and 9th units and in seedling development between the 7th and 11th units.—P. A. Davies.

6445. FARR, WANDA K., and WAYNE A. SISSON. Observations on the membranes of epidermal cells of the Avena coleoptile. Contr. Boyce Thompson Inst. 10(2): 127-137. 6 fig. 1939.—The cellulose component of the epidermal cell membranes of the Avena coleoptile is in the form of microscopically-visible ellipsoid particles of native crystalline cellulose arranged in transverse bands. During cell elongation the separated bands of cellulose are seen to be distributed at increasing intervals along the membrane without alteration of their orientation with respect to the long axis of the cell. The plastic state of the non-cellulosic component of the membrane is maintained during the period of cell elongation. This is shown by the separation of the transverse bands of cellulose particles and by the wave-like foldings along the lateral walls when the tension under which they are held in the growing coleoptile is relieved. Although it has been previously supposed that the cellulose in the elongating membrane of the epidermal cell of the Avena coleoptile is in a state of tension, this is rendered highly improbable since the cellulose is present in the form of discontinuous bands. It is now shown that during the process of cell elongation, the tension is exerted not upon the cellulose, but upon the more plastic non-

cellulosic, continuous phase of the membrane.—Auth. abst. 6446. KORODY, ELISABETH. Studien am Spross-Vegetationspunkt von Abies concolor, Picea excelsa and Pinus montana. Beitr. Biol. Pflanzen 25(1): 23-59. 23 fig. 1938.—The structure of the apical meristems in resting and expanding buds, the initiation of leaves and the differentiation of axial tissues are described. In each genus the apical meristem consists of a group of cells which may divide in any plane. A tunica is not present and the entire apex is regarded as corresponding to the corpus of angiosperms. Initiation of the leaves was studied in detail

angiosperius. Initiation of the leaves was souther in decan in Abies concolor, where epidermal cells were found to contribute markedly to the primordia.—G. L. Cross.

6447. MARCO, HERBERT F. The anatomy of spruce needles. Jour. Agric. Res. 58(5): 357-368. 7 pl. 1939.—Cross and longitudinal sections of Picea needles form the principal basis for detailed studies revealing anatomical features. Epidermal cells are equipped with teeth projecting into the cuticle, and are locked to one another by a modified dovetailed joint. Since libriform hypodermal fibers overlap, the variation in the size of the lumina is not of diagnostic value. The thickened upper and lower guard cell walls near the stoma are separated by 2 extremely thin, flexible membranes which collapse when the stomata are opened, bringing the 2 guard-cell walls in contact. With no, 1, or 2 resin ducts or cysts in any given spruce needle cross section the number of ducts is not of diagnostic value, but their diams. are constant within certain limits and can be used in identification. The number of strengthening or fibrous cells adjacent to the bundles is important as a distinguishing characteristic. Detailed anatomical descriptions are given for mesophyll, endodermal, and transfusion cells, and for fibrovascular bundles.—A. G. Snow, Jr.

6448. MARTENS, J. LOUIS. Some observations on sexual dimorphism in Carex picta. Amer. Jour. Bot. 26 (2): 78-88. 34 fig. 1939.—Floral analyses of C. picta growing near Bloomington, Indiana, show that the sexual expression of this dioecious species, although remarkably stable, has occasional androgynous inflorescences. The ontogeny and variations of the floral components in the pistillate inflorescences substantiate the interpretation, developed previously from monoecious Carices, that the ? "flowers" are morphologically spikelets. Similar observations upon staminate inflorescences suggest that the 3 "flowers" represent spikelets homologous with the pistillate. Sporogenesis begins with the differentiation of micro- and megaspore mother cells early in the autumn preceding anthesis. As is typical for spp. of Carex, 3 microspores of each tetrad disintegrate, only 1 pollen grain developing from a spore mother cell. The common type 7-celled embryo sac develops from a chalazal megaspore. Pollen tubes reach the embryo sac within 12 hours, and pollen grains grown on an agar medium frequently form more than one pollen tube. The ygotic number of chromosomes seems to be 32.—J. L. Martens.

6449. METCALFE, C. R. The sexual reproduction of Ranunculus ficaria. Ann. Botany 3(1): 91-103. 15 fig. 1939. The small percentage of viable seed, which is especially haracteristic of forms of R. ficaria which bear tubercles n the axils of the cauline leaves, is caused chiefly by various forms of degeneration of the embryo-sac or nucellus. Degeneration is frequent even when vigorous pollen tubes are present. Sexual reproduction often proceeds normally in forms of R. ficaria without axillary tubercles, which are especially frequent in the south west of England. Fertilization is not a necessary preliminary to the formation of endosperm, and expts. have shown that embryos sometimes arise from unfertilized eggs. Seed which is apparently viable is not always capable of germination for reasons which are fully described.—C. R. Metcalfe.
6450. NEUMANN, HENRI. Zur Kenntnis der Anatomie

und ersten Anlage der Gramineenligula. Beitr. Biol. Pflanzen 25(1): 1-22. 13 fig. 1938.—Ligules of 75 spp. of Graminae including representatives from all tribes were studied. 2 main categories of ligules are recognized, i.e., simple and compound. Simple ligules are homogenous in structure and lack vascular strands. Compound ligules have median portions which lack vascular strands and lateral portions which possess vascular strands. The lateral portions of the compound ligules are regarded as homologous with the lobes or auricles of the leaf sheaths of other Graminae. In Zea mays the ligule is initiated from 3 trans-

verse rows of epidermal cells.—G. L. Cross. 6451. SCHRÖDER, JOHANNES. Über natürliche und künstliche Änderungen des Interzellularvolumens bei Laubblättern. Beitr. Biol. Pflanzen 25(1): 75-124. 9 fig. 1938.— Intercellular volumes of a large number of leaves were detd. by a method of infiltration with oil of turpentine. The intercellular volumes of soft wintergreen leaves decrease appreciably during autumn and winter; but only small decreases occur in hard, stiff leaves. Sun and shade-leaves have approx, equal intercellular volumes immediately after expansion, but at maturity the intercellular volumes of expansion, but at maturity the intercentual volumes of shade leaves are about if greater. Peripheral shade-leaves have definitely lesser volumes than shade-leaves near the main axis, and only slightly greater volumes than sunleaves at the apex of the crown. Tropacolum, Impatiens, and Phaseolus grown in dry cultures acquire reduced intercellular volumes. The intercellular volumes of foliage leaves of trees can be increased or decreased by regulating the volume of the transpiration stream.—G. L. Cross.

AGRONOMY

Editor: CARLETON R. BALL. Associate Editors: M. A. McCALL, Crops; R. B. DEEMER, Soils (See also in this issue Entries 5304, 5312, 5324, 5331, 5332, 5360, 5385, 5989, 6001, 6262, 6441, 6442, 6508, 6522, 6535, 6560, 6563, 6583, 6588, 6589, 6623, 6648, 6649, 6657)

CROP SCIENCE (ARVICULTURE)

6452. ALVAREZ, ALEJANDRO S. Estudio comparativo de los constituyentes químicos de las variedades de cana P.O.J. 36 y P.O.J. 213. Rev. Indust. y Agric. Tucuman 28 (4/6): 111-122. 1938.—The 2 sugar-canes mentioned are considered to be best adapted to Tucuman, but which is superior to the other is in question. The ash content and the content of non-saccharin solids are considered of importance in the making of sugar. The author presents data on these points, stating the methods followed and presenting his results in 7 tables. He concludes that P.O.J. 36 is superior in its quality for sugar making owing to its lesser content of gums and albuminoids in the juice. The P.O.J. 213 shows a slight superiority owing to its low content of glucose and its high content of extractable sugar.—J. W. Gilmore.

6453. ANDERSON, J. ANSEL, HENRY R. SALLANS, and C. ALAN AYRE. Varietal differences in barleys and malts. III. Correlations between nitrogen and saccharifying activities. Canadian Jour. Res. Sect. C. Bot. Sci. 16(11): 456-466. 1938.—Investigations made with samples representing 12 vars of barley, grown at 12 exptl. stations in Canada, show that fairly close intra-varietal correlations exist between the total N of barley and the saccharifying activities of the barley and of the malt made from it; and that these correlations are closer than the corresponding correlations with N fractions. No inter-varietal correlation exists between saccharifying activities on the one hand, and total N, alcohol-soluble N, or insoluble N, on the other, but intervarietal correlations appear to exist between saccharifying activities and the more soluble N fractions. The correlations between the N, or nitrogen fractions, and total barley saccharitying activity (papain method), and between the N, or N fractions, and free malt saccharifying activity (Lintner value), are closer than the corresponding correlations for free and latent barley saccharifying activities. Latent barley saccharifying activities accharifying activity is more closely correlated with total N than with any of the N fractions studied. A study of the multiple correlations between malt saccharifying activity, and total N and 1000-barnel weight of barley above them. and total N and 1000-kernel weight of barley, shows that the improvement resulting from the introduction of 1000-kernel weight as a 2d independent variable is very small.—Auth. abst.

6454. BASU, KALI PADA, BOSE SARASHI PADA, QUADER ABDUL MOHAMMAD, and DE HARI NATH. Indian Jour. Med. Res. 26(3): 637-644. 1939.—The available

carbohydrate (glucose, fructose, sucrose and starch) in 8

vars. of pulses was estimated. Lathyrus sativus has 100%, lentil and Cajanus indicus have 91%, green gram has 89%, field pea 86%, black gram and Bengal gram have 74%, soya bean has 38% of the total carbohydrate in available form. The potential acidities of the above 8 pulses were detd, by analyses of their ash constituents. The acidity is least (1.87 cc. N acid per 100 g. pulse) in green gram and highest (5.01 cc. N acid per 100 g. pulse) in the lentil.— K. P. Basu.

6455. BORG, JOH., och OLOF SVANBERG. Resultat av gödslingsförsök i vall på näringsfattiga jordar. [Results of trials with fertilizers upon poor soils.] Meddeland. Svenska Betes- och Vallfören. 6. 1-40. 1938.—This reports the result of 4 years' trials with fertilizers on clover and timothy. The plan of the trials was: (1) No fertilizer; (2) 200 kg. secondary phosphate; (3) Same as 2, + 75 kg. 20% KCl; (4) Same as 3, + 100 kg. (NH₄)₂SO₄; (5) Same as 4, but no phosphate. These amounts were used are 0.5 by The trials was a surface or over 1.5 by The trials was a surface or over per 0.5 ha. The trials were carried out on several farms in Sweden, located in areas known for cattle diseases, viz., the island of Gotland and in Dalecarlia. The fertilizers had no influence on the calcium content of the grass and hay, except that N fertilizer caused a slight fall of Ca. However, because the total yield increased, the Ca yield also increased from about 24 kg. per acre to about 39 kg. per acre. The P content of the grass was increased up to 40% when the P fertilizer was used. The K content could be increased up to 16% with K fertilizer. The protein content of the grass (or hay) was influenced little or none by the fertilizer. The importance of trials covering several years is pointed out; e.g., the first year's fertilizing gave 35% increase in crop, while the 2- and 3-year trials showed an increase of 87 and 134% respectively. Fertilizing was found to be profitable. The importance of P fertilizer as a means of increasing the P content of grass and hay is stressed and recommended particularly for regions with soils poor in P, that is for the production of healthy farm stock animals.—S. Nordfeldt.

6456. BRYAN, H. Potato trials, Ormskirk, 1937. Jour. Nation. Inst. Agric. Bot. 4(3): 300-303. 1938.
6457. CAMINHA FILHO, A. Sobre o sistema radicular

da cana de açucar. Brasil Açucar. 11(5): 20-24. Illus. 1938. 6458. CLARKE, I. D., R. W. FREY, and H. L. HYLAND. Seasonal variation in tannin content of Lespedeza sericea. Jour. Agric. Res. 58(2): 131-139. 1 fig. 1939.—First cuttings, taken at weekly intervals from May 29 to July 31, showed a decrease in percentage of leaves in the whole plant from 61.6 to 42.8. Soluble matter increased in the leaves and decreased in the stems. Tannin, both total and fixable, was low and nearly constant in the stems during the period studied. In the leaves total tannin increased from 7.5% to 18% and fixable tannin from 3.8% to 11.6%. Astringency of the leaf tannin increased. Variation in tannin content may explain the apparent differences in palatability of different L. sericea hays.—I. D. Clarke.

6459. COLIN, H., et J. VIDAL. Sur l'epanouissement de la fleur de Betterave. Publ. Inst. Belge Améliorat. Betterave 6(5): 353-354. 1938.—In Beta maritima, B. patellaris, and 2 vars. of sugar beets (Hilleshög and Menesson B), pollen dissemination precedes stigmatic expansion.—W. W.

6460. CROSS, WM. E. El cultivo de la cana azucar en Tucuman. [The cultivation of sugar cane in Tucuman.] Rev. Indust. y Agric. Tucumán 27(10/12): 189-202. 1 fig. 1937(1938).—The author gives under progressive captions the major procedures and practices in the production of sugar cane; also the various special conditions and pre-cautions that must be observed.—J. W. Gilmore.

6461. CROSS, WM. E. Ensayos de caña de azucar. [Trials with sugar cane.] Rev. Indust. y Agric. Tucuman 28(1/3): 13-21. 2 fig. 1938.—Owing to the severe drought during the growing season of 1936-37, opportunities were offered to study the effects of both drought and the high salt content of irrigation water on sugar-cane, and in these respects var. Tuc. 379 has stood out prominently. Numerous hybrids, selections from local stocks and imported canes are under trial and data are given regarding their behavior under conditions prevailing. The conditions that most noticeably offset the effects of drought on plant cane (rainfall 20 in., ½ of the normal rainfall) were: abundance of organic matter incorporated in the soil the previous year; superior prepn. of the land before planting; use of furrows of optimum depth; use of fresh cane for planting; and the conservation of moisture by proper cultivation. For the rattoon crop, the negative aspects of the above procedures, with special emphasis on early cutting were emphasized.— J. W. Gilmore.

6462. DAVIES, W., and T. W. FAGAN. Winter keep on temporary leys. Empire Jour. Exp. Agric. 6(24): 369-376. 1939.—The paper relates to the yields (including botanical and chemical composition) of winter grass from a temporary ley in the spring of the 2d harvest-year. Different systems of management and manuring are compared on both pedigree and ordinary commercial seeds-mixtures. The pedigree mixture yielded more than twice as much winter grass, and was far more nutritious than the commercial mixture. Night-grazing gave a much higher yield of grass than day-grazing, and the grass was superior in protein, phosphoric acid and lime.—E. H. Tripp.

6463. DECOUX, L., J. VANDERWAEREN, et M. SIMON. Azote et varietes de Betteraves sucrieres. Publ. Inst. Belge Améliorat. Betterave 6(2): 39-55. 1938.—Sugar beet varieties with small top growth are more responsive to nitrogenous fertilizers than are those with large top growth as regards the yield of sugar, but less responsive as regards the yields of leaves and crowns.—W. W. Robbins.

6464. DECOUX, L., J. VANDERWAEREN, et M. SIMON. Potasse, azote et Betterave. Publ. Inst. Belge Améliorat. Betterave 6(2): 57-78. 1938.—Field expts. were made testing the influence of N and K₂O, when varied simultaneously, upon composition of sugar beet roots and upon the value of the juices. Large applications of K2O alone produced roots varying little in composition of expressed and purified juices from those receiving no K2O. Leaf growth, however, is influenced greatly by increasing doses of N and K₂O. Excess K₂O absorbed by the plant is stored in the leaf, which will tolerate as much as 5% of leaf dry matter. Heavy applications of N without K₂O had marked injurious effects, increasing harmful N in the root, decreasing yield of sugar. Ill effects of excess N are only slightly alleviated by simultaneous applications of K₂O. N content, and hence feeding value, of leaves is not increased by very large applications of N.—W. W. Robbins.

6465. DECOUX, L., J. VANDERWAEREN, et M. SIMON.

L'influence de l'azote sur la maturation de la Betterave sucriere. Publ. Inst. Belge Améliorat. Betterave 6(3): 177-

198. 1938.—N applied at the rate of 75 kg. per hectare had a favorable effect on the sugar beet root, the tops, and expressed and purified juices. Larger applications produced unfavorable results.—W. W. Robbins.

6466. DECOUX, L. Betterave sucriere et fourrage. Publ. Inst. Belge Améliorat. Betterave 6(4): 225-241. 1938.—One hectare of sugar beet produces, on the average, 35,000 kg. of leaves and crowns, and 20,000 kg. of pulp. The 55,000 kg. of by-products contains 950 kg. crude protein, 650 kg. crude digestible protein, and 560 kg. pure digestible protein. P_2O_5 and K_2O have a greater effect on the yield of roots and sugar than on that of leaves and crowns. Maximum value of leaves and crowns is obtained by the Pommritz

method of harvesting, including washing, cutting of tops and artificial drying.—W. W. Robbins.

6467. ERBRING, H., und H. GEINITZ. Über die Aufschliessung pflanzlicher Faserstoffe mit mehrwertigen Alkoholen. Kolloid Zeitschr. 84(2): 215-222. 1938.—Plant fibers such as straw, broom, and rushes may be broken down by treatment with glycerin or glycol at higher temp. and if necessary at higher pressure. During the splitting a swelling occurs that separates the lignin and loosens the connection between the cellulose and its encrusting substances, making possible a separation into individual fibers by a minimum of mechanical treatment. Addition of small amts. of organic acids and the use of mixtures of glycol or glycerin with

water is favorable.—M. Neuhof.
6468. GASKILL, JOHN O., and H. E. BREWBAKER. Storage of sugar beets under conditions of high humidity and low temperature. Jour. Amer. Soc. Agron. 31(2): 109-115. 2 fig. 1939.—Sugar beet roots were stored in a root cellar under conditions of high humidity and low temp. in open crates without cover for 5 consecutive years; a gradual but significant decrease in sucrose percentage occurred without any loss in root weight. After 125 days of storage the loss in sucrose was essentially the same for both pit-siloed and cellar-stored roots. The cellar method is convenient and efficient for storage of mother beets.—Authors.

6469. KANIVETS, I. I. Biokhimicheskie sposoby sozdanifa prochnoi struktury pochv i ikh rol v povyshenii urozhainosti kul'tur sveklovichnogo sevooborota. [Biochemical methods of forming solid structure of the soil and their role in increasing crop yields in sugar beet rotations.] [In Russ.] Khimizatsiia Sotsialisticheskogo Zemledeliia (Chemisation Socialistic Agric.) 1938(6): 51-60. 1938.

6470. KOCHETKOV, V. P. Udobrenie i uroznai v sveklovichnykh kolkhozakh. [The use of fertilizers and crop yields on sugar beet growing collective farms... of the Rakitiansky district in the Kursk province.] [In Russ.] Khimizatsiia Sotsialisticheskogo Zemledeliia (Chemisation Socialistic Agric.) 1938(5): 15-22. 1938.

6471. KRANTZ, F. A. Maturity of potato seedlings in the greenhouse and their later behavior in the field. Amer. Potato Jour. 15(6): 153-157. 1938.—Observations on 51 seedling potato families in 1936 and 68 families in 1937 showed significant differences to exist between the families for maturity in the greenhouse. 17 of the families, after 2 years of clonal propagation in the field, gave the same relative maturity as was previously obtained in the greenhouse. Similar results were obtained on groups of seedlings within the families for the 4 families under observation.—F. A. Krantz.

6472. KREIBOHM de la VEGA, G. A. Interesantes comprobaciones sobre el cultivo del algodonero en la provincia de Tucuman. Una prueba de loas condiciones extremas. [Observations on the cultivation of cotton in Tucuman: a trial under extreme conditions.] Rev. Indust. y Agric. Tucuman 28(4/6): 104-110. 4 fig. 1938.—The growing season of 1936-37 had only 57% of the normal (15-yr. av.) rainfall. This gave an excellent opportunity to make observations on certain phases of the cotton crop. Pre-irrigation and early planting gave excellent results. Late plantings (Jan. 20 and later) were advantageous only when the land had been winterplowed (Apr.-June). The importance of clean culture during a dry season is emphasized, and the drought resistance of cotton is noted. (Author does not mention quality of lint.). He does not give much credence to the doctrine that excessive moisture reduces the cotton crop. He believes that cotton is better adapted to poor soils than many other crops.—J. W. Gilmore.
6473. KREIBOHM de la VEGA, G. A. Improductividad

del algodonero, un interesante caso de Acromania o puntas locas (crazy top) de algodon en el Departamento de Trancas, Provincia de Tucuman. [Unproductivity of the cotton plant, an interesting case of Acromania or crazy top of cotton in the Dept. of Trancas, Province of Tucuman.]

Rev. Indust. y Agric. Tucuman 28(4/6): 127-133. 5 fig. 1938.—Crazy top (Acromania) of cotton has appeared for the first time in Tucuman. It occurs in 2 fields, about 25 km. apart. The disease is described and figured, and control measures are suggested (frequent and adequate irrigations, and superior culture so that the plants may be maintained in vigorous growth). The cause is ascribed to hot, dry weather.—J. W. Gilmore.

6474. MARTIN, J. T., H. H. MANN, and F. TATTERS-FIELD. The manurial requirements of pyrethrum (Chrysan-Field).

themum cinerariaefolium Trev.). Ann. Appl. Biol. 26(1): 14-24. 2 pl. 1939.—A small field expt. upon the manurial requirements of the insecticidal pyrethrum plant, grown upon sandy soil of low fertility, is descr. Lime produced slight, but not significant increases each year in the yield of flowers and their content of the pyrethrins, and decreased the percentages of plant failures in the 4th and 5th years of the expt. There was a significant depression in the yield of flowers in the year after the single application of double dressings of the manures, but no effect in later years. The yearly application of moderate dressings of manures gave significant increases in the yield of flowers in the 2d and 5th years, and significant increases in the pyrethrin I content of the flowers in the 4th and 5th years of the expt.—J. T. Martin.

6475. MOTZOK, I. Fundamental studies of the Neubauer plant seedling method for the determination of the rootsoluble phosphorus in soils. Sci. Agric. [Ottawa] 19(4): 221-232. 1938.—In the Neubauer sand cultures, the P_2O_5 blank values of the spring common wheat, Reward, were more constant than those of Cornell 45 rye. Maximum P_2O_6 assimilations from soils by Reward wheat were reached in 12-15 days, as compared with the 17-day period advocated for the rye. The relative P_2O_6 absorption capacities of the 2 grams varied considerably on different soils, and field investigations would be necessary to determine which cereal would give a more reliable index of the fertility level of the would give a more reliable index of the fertility level of the soil In this technique the Rosen and Cornell ryes showed greater P absorption capacities than the Petkuser rye used by European workers. A genetic factor, as well as the species, apparently influences the P-extracting power of the variety.

—I. Motzok.

6476. OBANNON, L. S., and W. D. VALLEAU. A machine for cleaning tobacco seed. Kentucky Agric. Exp. Std. Bull. 381. p.101-112. 5 fig. 1938.—The tobacco seed cleaner described is of the blower type and does not employ

Geaner described is of the blower type and does not employ sieves, separates heavy and light seed effectively, and is satisfactory for cleaning both small and large lots of seed.—

H. M. Steece (courtesy Exp. Sta. Rec.).

5477. OWEN, FORREST V., FRED A. ABEGG, ALBERT M. MURPHY, BION TOLMAN, CHARLES PRICE, FINLEY G. LARMER, and EUBANKS CARSNER. Curly-top-resistant sugar-beet varieties in 1938. U. S. Dept. Agric. Circ.

513. 1.9. 2 for 1939. Under severe guily-top and 513, 1-9, 2 fig. 1939.—Under severe curly-top exposure and with other conditions relatively unfavorable, U. S. 12 yielded 10.52 tons per acre as compared with 7.09 tons for U.S. 33 and 1.6 tons for R. & G. Old Type. Its tendency towards bolting renders U.S. 12 satisfactory for late spring plantings, but unsatisfactory for conditions strongly conducive to bolting. Sucrose percentage is satisfactory. U. S. 14 is lower in bolting tendency than any curly-top-resistant var. heretofore released. Its curly-top resistance is about as in U. S. 1. It is susceptible to downy mildew. Seed growing in mild climates by the overwintering in the field method is unsatisfactory with vars. low in bolting tendency and with all vars, results in deterioration through increasing bolting tendency. The method can, however, be used satisfactorily in relatively cold climates to produce stock seed and low-bolting vars.—E. Carsner.

6478. PERKINS, A. E., C. C. HAYDEN, C. F. MONROE, W. E. KRAUSS, and R. G. WASHBURN. Making silage

from hay crops. Ohio State Bimonthly Bull. 190. 3-12. 3 fig. 1938.—The feasibility of making silage from hay crops, including both the legumes and grasses, is pointed out. The beneficial effects of adding molasses or other forms of carbohydrate and of adding mineral acids in preparing such silages, also the conditions under which satisfactory silage may be made without treatment, are indicated. In connection with recommendations regarding the proper dry matter content of material to be ensiled, data are presented on the loss of juice from chopped plant material of varying dry-matter content when subjected to pressures of from 2 to 12 lb. per sq. inch, comparable to pressures actually existing at different levels in silos. A cloveralfalfa mixture containing 18% dry matter lost 30% of the original weight in drainage juice when subjected to a pressure of 8 lb. per sq. inch. The dry matter loss in this juice amounted to 10.8% of the original dry matter in the crop. The proper control of dry matter is probably the most important consideration in silage making.—E. C. Elling

(courtesy of Exp. Sta. Rec.).

6479. RIVAZ, C. P. Application of the Neubauer rye seedling method of soil analysis to fertility studies in Ontario. Sci. Agric. [Ottawa] 19(4): 210-220. 1938.—Experience with the Neubauer method showed that vitality of the rye seed is particularly important; a var. of rye known as Cornell 45 gave satisfactory results and is recommended. A simple seed counting device is descr. as well as the method of ashing and the technique of the analytical procedures. Application of the method to soils of SW Ontario indicated the Brookston and Clyde series to be high in K, deficient in P. Pasture land soils of the Niagara Peninsula and western Ontario were very low in P with the K₂O tending to be related to texture. Central Ontario soils were higher in P and lower in K₂O. Variations within a given soil type may be wide, although a type usually shows definite fertility characteristics.—C. P. Rivaz.

6480. ROBITZSCH, J. Die Entwicklung der Ackerbohne in Abhängigkeit von Tageslänge, Keimtemperatur und Aussaatzeit. [The development of field beans in relation to length of day, germination temp., and seeding time.] Jour. Landw. 86(2): 127-162. 1938.

6481. ROGERS, L. H., O. E. GALL, and R. M. BAR-NETTE. The zinc content of weeds and volunteer grasses and planted land covers. Soil Sci. 47(3): 237-243. 1939.— Previous studies on the beneficial effects of "land resting" and on the use of ZnSO. in preventing the development of white bud of corn suggested a study of the Zn content of indigenous and planted cover crops. Samples of 10 spp. of weeds and volunteer grasses and of the planted summer cover crops of 3 spp. of *Crotalaria* were collected in autumn from the plots of a "land resting" exp. conducted on Norfolk and Hernando fine sands. By use of a spectrographic procedure, the Zn content of the ashes of these materials was detd. The dry matter of the weeds collected from plots was detd. The dry matter of the weeds collected from pious "rested" for 2 years averaged 140 p.p.m. of Zn; that of C. spectabilis planted annually, 8 p.p.m. The dry matter of weeds and grasses collected from plots "rested" for 1 year averaged 70 p.p.m. of Zn, that of 3 spp. of Crotalaria planted in plots in a 2-year rotation with corn and peanuts, 21 p.p.m.—Weeds and volunteer grasses are evidently able to p.p.m.—Weeds and volunteer grasses are planted land absorb much larger proportions of Zn than are planted land covers and apparently make available sufficient Zn to prevent the development of white bud of corn.—Auth.

6482. RUHNKE, G. N., C. P. RIVAZ, and W. T. EWEN. A comparative study of rapid chemical tests and Neubauer analyses on some typical Southern Ontario soils. Sci. Agric. [Ottawa] 19(4): 199-209. 1938.—Studies by Neubauer Analysis of representative soils of the cornbelt of Ontario showed that the method gives a valuable index to the availability of the P and K. As a basis for their calibration, the Thornton (et al.) P and K tests, and a modification of the P test, employing 0.05 N HCl as an extractant, were compared with the Neubauer results obtained for other Ontario Soils. The Modified P test appears to be more suitable for this Province than the Tho. The K₂O test correlates fairly well with the Neubauer results except in case of an abundant supply of K.—Authors.
6483. SAVAGE, D. A. Grass culture and range improve-

ment in the central and southern Great Plains. U.S. Dept. Agric. Circ. 491. 1-55. 23 fig. 1939.—Results of limited grass investigations conducted in the central and southern Great Plains during the past 50 years, together with general observations by research workers in the region, show that abandoned farm land reverts naturally to a good stand of native grasses in 25 to 40 or more years. Natural recovery may be hastened by taking advantage of favorable seasons in properly establishing adapted grasses. Where soil blowing is severe, high-cut stubble of close-drilled Sudan grass affords the safest seedbed for perennial grasses. Blue grama (Bouteloua gracilis), side-oats grama (B. curtipendula), buffalo grass (Buchloe dactyloides), galleta grass (Hilaria jamesii), and several other adapted grasses may be seeded alone, in mixtures with each other, or in conjunction with resodding of buffalo grass more successfully than with nurse crops. Most species may be sown advantageously medium early in the spring, although winter-growing grasses respond better when seeded in the fall or early in the spring. A combination of broadcasting and drilling at 1-inch depth is suggested. Reseeded fields should be clipped but not grazed during the 1st growing season and part of the 2d. Deferred and rotation grazing offers the surest means of improving depleted pastures and maintaining them in good condition. Reseeding of range pastures is seldom as successful as that of cultivated fields, but is accomplished in the same manner, except that no preparatory crop is used and the seedings must be made early in the spring to avoid undue competition with associated plants. Mowing or other treatment is advisable for shrub control on many

ranges.—D. A. Savage.
6484. SCHIEBLICH, JOHANNES. Untersuchungen zur Zuchtung von Sudangrass und Hirsearten. Landw. Jahrb. 86: 372-431. 1938.—This is a study of the general taxonomy and use of Sudan grass (Sorghum sudanensis), S. halepense, S. vulgare, Panicum miliaceum, Setaria and Pennisetum spicatum. The systematic position of each form, the distribution and vars. and flower biology of each form are discussed and inquiry made into the possibilities of growing these spp. in Germany either for forage or grain. In nearly every case the successful introduction of these plants into German agriculture will require the selection of suitable strains, especially with respect to earliness of maturity. An account is given of some of these breeding expts which have not yet proceeded to the point of desired success. Under Sudan grass attention has been especially directed to selection for freedom from HCN. While plants were found that showed scarcely a trace of the poison, selection to the F2 has not resulted in a form homozygous for this character. Sorghum vulgare (Sorghumhirse, sorghum millet) and Sudan grass thrive on poor soil with limited moisture but need high temps. Here too the effort is being made to select an earlier strain. A hybrid of Sudan grass and sorghum showed remarkable hybrid vigor. The culture of millets has declined in Germany as well as in the whole of Europe. Breeding work is being directed toward the use of these forms for grain rather than for fodder.—A. J. Pieters.

6485. SERRANO, LEONCIA L. Moisture contents of clay loam at the time of wilting of rice plants of different ages. Philippine Agric. 27(7): 530-547. 3 fig. 1938.—As the rice plants grew older, more and more moisture was left in clay loam at the time of wilting: older plants evidently wilted earlier than younger ones. In general, the higher the air temp., the smaller was the percentage of moisture that the plants could extract from the soil before wilting. The relative humidity of the air appeared not to have had a decisive influence in determining the amount of water that the roots of the rice plant failed to remove from the clay loam in pots.-M. Manresa.

6486. SINGH, B. N., and L. B. SINGH. Relative absorption of nutrients by weeds of arable land. Soil Sci. 47(3): 227-235. 1939.—With a view to locating the stage of maximum absorption of nutrients by weeds in general, Chenopodium album, Argemone mexicana, Launaea nudicaulis and Oxalis corniculata, were analyzed and the cones. of the different essential elements at successive stages of their life cycle were noted. The absorption per plant increases throughout the life cycle, although during the latter part the rate slackens. The gain in absorption per plant attains

the maximum in all cases at the preflowering stage of the weed, which is thus taken to be the stage of maximal absorption. The weed samples of this particular stage were utilized, therefore, for the bulk of the work. Analytical data at the time of maximal absorption for all weed spp. reveal that the different elements are absorbed in different quantities, some elements being in higher conc. than others. On the basis of this observation, the weed spp. have been arranged into 3 categories, the distinguishing feature of each group being the preponderance of a particular element. Of the 3 groups—weeds rich in N, weeds rich in Ca, and weeds rich in K—the first is the largest and the last is the smallest. Most of the members of a certain family possess a greater affinity for a particular ion than for other ions. This is especially true, though observed more or less in all the spp. of a family, when individual genera are considered. The possibility of classifying plants according to their physiological behavior is indicated. Further data in this regard may reveal phyletic relationship interspersed in such physiol. groupings.—Auth. summ.

6487. STANKOV, N. Z. Izuchenie izmenenii v strukture urozhafa zlakov v zavisimosti ot uslovil mineral'nogo pitanifa. [The study on the variations in the structure of the yield of grain crops due to the conditions of mineral nourishment.] [In Russ.] Khimizatsiia Sotsialisticheskogo Zemledeliia (Chemisation Socialistic Agric.) 1938(5): 74-81. Illus. 1938.

6488. STEHLIK, V. La feuille de betterave sucriere. Publ. Inst. Belge Améliorat. Betterave 6(3): 143-176. 1938. This is an exhaustive study conducted over a period of years at Semcice, Czechoslovakia. It discusses the develop-ment of leaves, their arrangement, venation, relation of leaf morphology to sugar production, and influence of diseases and abnormalities on leaf development. There are numerous illustrations.—W. W. Robbins.
6489. STROMEYER, W. Zur Lage der deutschen Flachs-

wirtschaft. 264p. G. Fischer; Jena, 1938. 6490. TORSTENSSON, G. Skördeintervallens och stubbhöjdens inverkan på avkastning och rotutveckling hos gräs. [Yield and root development of grass as influenced by the time elapsing between the cuttings and the length of the stubble.] Meddeland. Svenska Betes- och Vallfören. 5. 1-35. 1938.—Yields and root development of Lolium perenne, Festuca pratensis and Phleum pratense were studied, over a 6-yr. period, in exps. carried out partly in "Mitscherlich vessels" and partly in field trials. In the in vitro trials the grass was cut, in one series every 15th day and in another series every 10th day, leaving a stubble 5 cm. or 2 cm. long. When cut every 15th day, the yields were about the same whether 2 or 5 cm. stubble was left; if cut every 10th day, the yields and root development also were less from the shorter stubble. Cutting every 10th day with 5 cm. stubble always gave better yield than did cutting every 15th day leaving a 2 cm. stubble. In the field trial the grasses were cut as often as possible during one summer, in one case to 7 cm. and in another to 2 cm. stubble, and the yield taken in the following summer. Both yield and root development were slightly better where the 7 cm. stubble had been left were slightly better where the 7 cm. stubble had been left but the differences were not significant. In another study, including both vessel and field trials, the influence of the "grazing time" and the regrowth period upon the yield was investigated. Short "grazing time" was compared to long; the former was combined with long period for regrowth, while the latter was combined with short period for regrowth. With the short "grazing time" the grass was cut to 2 cm. stubble and then given an "ordinary" 14 days period of regrowth. In the long "grazing time" the grass was cut during 7 successive days to a 2 cm. stubble and then given a regrowth period of 8 days. During a 3-years' then given a regrowth period of 8 days. During a 3-years' trial the yield was best with the short "grazing time" and

the ordinary 14-day period for regrowth.—S. Nordfeldt.
6491. TYSDAL, H. M., and T. A. KIESSELBACH. A1falfa nursery technic. Jour. Amer. Soc. Agron. 31(2): 8398. 1939.—By appropriate plantings, alfalfa nursery technic
was studied under Nebraska conditions resulting in the following conclusions: Solid-drilled plats 16 feet in length with rows spaced 7 in. apart were subject to serious interplat varietal competition. The effects of this could be overcome by discarding border rows at harvest, or by widening the alley space between plats to 12 inches. The yields from

single- or multiple-row plats with either 18- or 24-inch rowsingle- or multiple-row plats with either 18- or 24-lifel low-spacing likewise exhibited no significant differential interaction and the relative yields compared favorably with those from field plats. Space-planted plats were less accurate for yield determinations than solid-drilled plats for testing alfalfa strains, especially if they differ in rate of crown development. Rate-of-seeding tests indicated that there may be considerable latitude in the amt. of seed sown per row, but it seems preferable, regardless of row spacing, to sow at the rate of approx. 1.5 g. per 16-foot row which is at the rate of 15 lbs, per acre for 7-inch spacing. Comparison of adjacent unlike plat types showe striking and significant modifications in plat yields. E.g., when a solid-planted row was 7 inches from a space-planted row it gave an excess yield of 74%, while the space-planted row was depressed 63% in yield. Similar results were obtained when unequal adjacent row-spacings were involved.—Great care must be exercised in taking yields from adjacent rows which are apt to be either at an advantage or disadvantage with respect to spacing of rows or density of stand.—Authors.

6492. WEBBER, J. M. Relationships in the genus Gossypium as indicated by cytological data. Jour. Agric. Res. 58(4): 237-261. 1939.—The meiotic chromosome conjugation in Gossypium is reported of (1) F. of 23 new interspecific hybrids including 12 different types of hybrids; (2) F_2 of certain 13×13 chromosome combinations; and (3) F_2 and F_3 of certain 13×26 chromosome combinations. The conjugation observed, in conjunction with that previously reported supports the grouping of Gossypium spp. as (1) The Australian species Gossypium sturtii, (2) Asiatic species; (3) Wild American spp.; (4) Cultivated American spp. The indicated relationships of species within and between these groups is discussed. Evidence is given for and against the various hypotheses as to the origin of 13chromosome spp., and of the purely American origin of the cultivated American cottons.—J. M. Webber.

6493. WHYTE, R. O. (edited by). Report of the Fourth International Grassland Congress. xxxiv + 486p. IVth International Grassland Congress: Aberystwyth, 1937. Pr. 40s.— This Report contains lists of the officers of the Congress, a table of contents, full texts of the presidential address, plenary papers, sectional papers, and discussions, the names and addresses of persons attending the Congress, and indexes of authors of papers and contributors to discussions. The authors of the 13 plenary papers represent 9 countries; mostly deal with somewhat wide topics of special importance in their particular countries; and give a good idea of present viewpoints. Grass drying is discussed by Woodman. Vezzani and Carbone of Torino deal with alpine grazing of cattle, a primary issue in Northern Italy. More than 70% of the occupied land of Australia south of the tropic of Capricorn is used for wool growing and Marston of Adelaide, therefore, discusses the nutritive value of pastures for wool production. American plant breeders are perfecting techniques of grass breeding, and clarifying objectives so as properly to relate plant breeding to other grassland improvement activities. Cardon of Washington deals, therefore, with plant breeding in relation to pasture improvement. Sweden is the home of the ecotype concept, and Sylvén of Svalöf considers the importance of ecotype formation for the breeding of herbage plants. In Sweden, grasslands occupy nearly one-half of the total agricultural area and, as grassland management is in a transition state, Osvald of Uppsala discusses achievements and aims in modern Swedish grassland management. At Aberystwyth one of the main themes has been strain building in the herbage grasses and this subject is dealt with by Jenkin. Pedigree grasses need to be multiplied, distributed, and grown, and the part played by seedsman and farmer is considered by Miln of Warrington. In New Zealand, about 14 million acres of forest have been felled and sown to grass, and about 2 million acres of fern and scrub land. Awaiting development are still about 2 million acres of fern and scrub land and some 4 million acres of standing forest. This problem of the conversion of rain forest to grassland is discussed by Bruce Levy of Palmerston North. It has long been known that non-legumes derive benefit when grown in association with legumes, but the phenomenon has presented obscurities. During the last decade it has been studied by Virtanen of

Helsinki who puts forward an explanation. In Canada the few species of grasses and legumes that are grown ex-tensively are highly adapted to the rather exacting climatic conditions, and Kirk of Ottawa discusses their evaluation for pasture. In world agriculture soil erosion has become an imperative issue, and a recent survey has shown that, in the United States, about 100 million acres are so seriously eroded as to be practically worthless for continued cropping, while a further 100 million acres rapidly are becoming worthless. The outstanding value of pastures in soil-erosion control is now recognized and is discussed by Enlow of Washington. In Germany, grassland research is well advanced, and enables Klapp of Bonn to consider the principles governing the value of herbage plants for hay and pasture use. These plenary papers contain nothing strikingly new, but they are interesting and serve to emphasize some of the main general issues confronting world agriculture today.

The Congress was organized in 6 sections as follows: (1) Grassland ecology, including range management; (2) Seed mixtures, legumes for use in poor pastures; (3) Plant breeding, genetics and seed production; (4) Manures and fertilizers, soil aspects of grassland; (5) Nutritive value of pastures, fodder conservation; (6) Pastures, management, yields and economics. To a large extent the sectional papers deal with the same general problems as the plenary papers but help to fill in the details and, as the contributors represent 18 countries, the papers embody an unusual width of knowledge and experience. It is not possible to review the 55 sectional papers, or even to mention individual contributions. On the whole the papers are of high quality and many of them are exceedingly interesting. Grassland diseases are not considered, and only one paper is devoted to grassland pests.—From rev. by W. B. Brierley (courtesy of Ann. Appl. Biol.).

6494. WOOD, R. C. Experiments on compost-making. Empire Jour. Exp. Agric. 6(24): 350-368. 1938.—In view of the many factors involved, it is not possible even with standard material—in this case chaffed maize straw—to lay down any definite programme for composting. Of the factors controlling decomposition, aeration and moisture are the most important. Neither correction for acidity nor the use of inoculating material was found necessary, except in the latter case when very rapid decomposition was desired; but the more rapid the decomposition, the more expensive the process. The most efficient process is one involving predecomposition by trampling under the feet of stock.-

E. H. Tripp.

6495. WORZELLA, W. W., and G. H. CUTLER. A critical study of technique for measuring granulation in wheat meal. Jour. Agric. Res. 58(5): 329-341. 2 fig. 1939.—Expts. dealing with a critical study of technique for measuring meal granulation were conducted over a period of 2 years during which time more than 2,000 samples were sifted. A new apparatus, the granulometer, was developed, and the nature of meal fractions is illustrated and descr. From the results obtained in a systematic study of 11 steps in the procedure, the following technique has been adopted: 10 g. of clean, sound, normal wheat, containing about 10% of moisture, are ground into a fine meal. Immediately after grinding, a 2.5 g. sample is weighed and transferred to the larger sieve (60-mesh and 270-mesh sieves used) and sifted for 1 hr. in the granulometer. The material that passes through the finer sieve or into the pan is weighed. weight of this fraction is expressed as percent of total and is designated as particle-size index. A low index indicates a coarse meal and a higher index indicates a relatively finer meal.—Auth. summ.

6496. ANONYMOUS. The story of one heavy rainstorm. Farm. Res. [New York State Sta.] 4(4): 4. 1938.—During a total rainfall of 4.5 in. over a period of 12 hr., with maximum intensity of 6 in. per hour, plats at the station gave maximum losses of soil and water on a fallow plat of Dunkirk soil. About 66% of the total rainfall was lost as run-off, carrying with it 46 tons per acre of topsoil. This very severe loss occurred on a very moderate 5% slope. On a steeper slope, a fallow plat on the somewhat more permeable Ontario soil lost 52% of the rainfall as run-off, and 24 tons per acre of soil. A similar fallow plat of Ontario

soil, on which a green manure crop of rye had been turned under, lost 42% of the rainfall as run-off, and 13.5 tons per acre of soil. "Corn across the slope on Dunkirk soil allowed a 28% loss of rainfall as run-off accompanied by an 8 tons per acre soil loss. . . A red clover plat lost 5.5% of the rainfall, and only 89 lb. of soil per acre. Soybeans and grass lost less than 1% of the rainfall and 30 and 10 lb. per acre, respectively, of soil."—Courtesy Exp. Sta. Rec.

6497. ANONYMOUS. Handbook of experiments in

agronomy. Ohio Agric. Exp. Sta. Spec. Circ. 53, 1-115, 1 pl., 2 fig. 1938.—Additional data are provided on variety and cultural (including planting) tests with corn, wheat, oats, barley, soybeans, and alfalfa; variety tests with seed flax, clovers for hay, red clover, and corn hybrids vs. vars.; trials of spring grains, flax, and field peas separate and in mixture, soybeans with corn and Sudan grass, meadow mixtures, and crop combinations for hay; seedbed preparations for wheat, oats, and soybeans; straw mulch for wheat; tillage experiments; cutting tests with soybeans, alfalfa, red, mammoth, white, and alsike clovers, Kentucky bluegrass, and timothy; harvesting studies with wheat, oats, corn, and soybeans; the P content of alfalfa hay; yield and composition of sweet clover roots; yield and N content of roots and tops of Korean lespedeza harvested at 4 dates for soil improvement; crop rotations and effects of different crop sequences; and lawn expts., including time and rate of seeding, establishment on surface soil and subsoil, maintenance of turf grasses, intake of N by turf grasses following fertilization, observations on roots and rhizomes from Kentucky bluegrass, effects of peat as a mulch and incorporated in the soil on bent and Kentucky bluegrass, a method for watering lawns, and control of dandelion, buckhorn plantain, crabgrass, and moss in lawns. Expts. with fertilizers, soil reaction, lime, and manure are noted.—Courtesy Exp. Sta. Rec.

SOIL SCIENCE (EDAPHOLOGY)

6498. JACKSON, M. L., and M. D. WELDON. Determination of the weight of water in a soil or subsoil mass in which the moisture content increases with distance from a plant or group of plants. Jour. Amer. Soc. Agron. 31(2): 116-127. 1939.—Formulas are derived based on the curve for increase in moisture content with increasing distance, drawn from data at 2 or more soil sampling distances from the plant. A double integration also takes into account the increasingly greater amounts of soil volume corresponding to the moisture content at sampling positions successively further from a plant. With plants arranged in a checker-board, i.e., as squares, the weight of water, W, available to each plant in a given foot of depth is:

 $W = 1.9104Vr^2 \left[\frac{P_2 - P_1}{q_2} \right] + 2.4972Vr^2 \left[P_1 - \frac{(P_2 - P_1)q_1}{q_2} \right]$

where $P_1 = \%$ water at q_1 distance, and $P_2 = \%$ water at $q_1 + q_2$ distance from plant, r = one-half the distance between plants in a row, and V = soil volume-wt. (g./cc.). The formula is applied for each successive foot interval of depth. Modifications of the formula are given for other plant spacings.—Authors.

6499. KELLEY, W. P., A. O. WOODFORD, W. H. DORE, and S. M. BROWN. Comparative study of the colloids of a Cecil and a Susquehanna soil profile. Soil Sci. 47(3):

175-193. 1939.

6500. PURI, AMAR NATH, and H. L. UPPAL. Base exchange in soils. I. A critical examination of the methods of finding base-exchange capacity of soils. Soil Sci. 47(3): 245-253. 1939.

6501. ROMINE, DALE S., and W. H. METZGER. Phosphorus fixation by horizons of various soil types in relation to dilute acid extractable iron and aluminum. Jour. Amer. Soc. Agron. 31(2): 99-108. 1939.—Samples of soil from the various horizons of 9 soil types in Kansas were treated with dilute H_3PO_4 solns, and P absorption was detd. by the change in conc. of the P soln. after contact with the soil. B horizons absorbed more P than A horizons, presumably because of the accumulation of Fe and Al in the former. When the soil samples were extracted with Truog's buffered extracting reagent (.002 N H₂SO₄) the "absorptive capacity" was reduced. This reduction showed a general relationship to the R₂O₅ removed by the extracting reagent. Since P in the R₂O₆ was negligible in comparison with the sesquioxides it was assumed that removal of some of the free Fe and Al by the dilute acid brought of some of the free Fe and Al by the dilute acid brought about the reduction in the power of the soil to take up P. This suggests that plants grown on even moderately leached soils are largely dependent for their P supply upon P combined with Fe and Al.—Auth. summ.

6502. WAKSMAN, SELMAN A. Humus. Origin, chemical composition, and importance in nature. 2nd ed. xiv + 526p. 44 fig. Williams and Wilkins Co.: Baltimore, 1938. Pr. \$6.50.—One new chapter has been added, that entitled "Humus and Soil Conservation" (8p.). Numerous changes, substitutions, and additions have been made throughout the book without appreciably altering its size. Reference has been made to a considerable amount of new material. -From review by R. L. Starkey (courtesy Soil Sci.).

6503. WILDERMUTH, ROBERT, S. O. PERKINS, R. E. PASCO, and EDGAR H. HUBBARD. Soil survey of Kitsap County, Washington. U. S. Dept. Agric. Bur. Chem. and Soils 1934(12): 1-41. Map, 4 fig. 1939.

6504. YOUNGS, F. O., and D. S. JENNINGS. Soil survey of the Price Area, Utah. U. S. Dept. Agric. Bur. Chem. and Soils 1934(13): 1-24. Map, 2 pl., 1 fig. 1939.

HORTICULTURE

F. C. BRADFORD, Editor

(See also in this issue Entries 5294, 5314, 5316, 5320, 5322, 5327, 5360, 5371, 6385, 6530, 6560, 6583, 6586, 6588, 6616, 6662, 6678, 6679)

6505. BARNELL, E. Studies in tropical fruits. V. Some anatomical aspects of fruit-fall in two tropical arboreal plants. Ann. Botany 3(1): 77-89. 14 fig. 1939.—Anatomical investigations show that fruit-fall in the mango (Mangifera indica) and avocado (Persea americana) is a normal phase in the progressive ripening of the fruit tissues, separation being due primarily to dissolution of the middle lamellae of cells at the base of the fruit. The position of the plane of separation is predetermined by morphological and anatomical features such as the juxtaposition of lignified and cellulose walled tissues, grooves on the stalks, etc. Some time after fruit-fall and previous to the shedding of the fruit-stalk absciss cork layers are formed at the junction of the stalk and leafy stem.—E. Barnell.

6506. BLAKE, M. A. The temperature factor in fruit production. New Jersey State Hort. Soc. News 19(6): 1047-

1049. Illus. 1938.

6507. CLAY, S. The present-day rock garden, being a complementary volume to Farrer's "English rock-garden." 681p. T. C. and E. C. Jack: London, 1937.

6508. DUNLAP, A. A. Phosphate retention by sand in relation to seedling culture. Amer. Jour. Bot. 26(1): 15-17. 1939.—Sufficient phosphate, applied in previous cultures, was retained by a white sand after thorough washing to satisfy the need of seedling tomato plants. Retention was greatest in colored sands and among the finer particles. Treatment with HCl lowered the PO-retaining capacity. A. A. Dunlap.

6509. FLOYD, W. W., and G. S. FRAPS. The vitamin C content of some Texas fruits and vegetables. Food. Res. 4(1): 87-91. 1939.—The quantities of vitamin C were detd. by titration with 2.6-dichlorophenolindophenol in 217 samples of Texas foods, and the results are expressed as mg. of ascorbic acid per 100 g. of food: cabbage (130), mustard (165), peppers (104-281), turnip greens (162), cantaloupes (7.3-37), grapefruit (31-44), lemons (11-44), oranges (29-46), persimmons (43), turnip roots (47.1), sweet potatoes (20.3), limes (16 to 21), and tomatoes (17.9), contained appreciable amts.; carrots, egg plant, grapes, onions, peaches, pears, plums, pomegranates, shallots, and watermelons con-

tained less than 10 mg. per 100 g. Appreciable differences between different vars. of the same plant were indicated, such as from 2.7 to 9.1 mg. per 100 g. in 9 vars. of watermelons, 29 to 46 in 6 vars. of oranges, 11 to 44 in 7 vars. of lemons, and 7.3 to 37 in 6 vars of cantaloupes. Cantaloupes, muskmelons, peaches, mustard, and persimmons contained more ascorbic acid than previously reported by other

workers.—Authors.
6510. FRANÇOIS, E. Le manioc, sa production et son utilisation. Rev. Bot. Appl. 18(204/205): 533-573. Illus.

6511. FRANÇOIS, E. Le manioc, sa production et son tilisation. (concl.) Rev. Bot. Appl. 18(206): 682-707. utilisation.

Illus. 1938.

6512. GRAINGER, JOHN. The internal temperatures of fruit-tree buds. II. Ann. Appl. Biol. 26(1): 1-13. 3 fig. 1939.—Thermo-electric methods were employed to obtain continuous records of the internal temps. of buds of apple and raspberry. These are, in general, warmer than the surrounding air during the day, owing to solar radiation, and cooler during the night, owing to evaporation of water from the buds. Apple bud temps, during frosts in the dormant period usually agree closely with the temp, of the surrounding air. Exps. on the control of frosts with flame-type orchard heaters burning crude oil, show that such heaters do not warm the bud by direct radiation from the flames, but warm the air by convection. Bud temps. of the apple are lower than the surrounding air, owing to increased evaporation induced by the drying effects of the heaters. The air temp. is raised by only 2-3°C. under the most favorable conditions. The margin of efficiency of the flame-type heaters is low. Suggestions for improved methods are given. Developing fruits of the raspberry are warmed considerably above the air during sunshine; this might account for the quick ripening of these fruits.—J. Grainger.

6513. HARTMAN, HENRY. Hartman explains latest development in handling pears. Better Fruit 33(2): 3, 4; (3): 3, 6, 7. 1938.—The author briefly sums up the work with pear handling in progress at Oregon Exp. Station since 1917. Much of the investigation has been done in eastern terminal markets. Proper harvesting, immediate eastern terminal markets. Proper harvesting, immediate refrigeration and proper ripening before reaching consumers are prerequisites. At 65°-70°F pears ripen 10 times as rapidly as at 30°-31°. Anjou and Nelis could be kept in storage 3 weeks longer at 30-31° than at 32-33°. Core temperature is about 1° higher than the air. Freezing injury occurs between 27° and 28°, but circulated air at 30-31° causes no injury. Temps. of 35° to 45°F are fatal to Bosc and Bartlett; they will not keep nor will they ripen. to Bosc and Bartlett; they will not keep nor will they ripen. For Oregon and Washington grown pears, Bartlett can be kept in cold storage 35-45 days, Bosc until Christmas, Comice to Feb. 10, Anjou to Apr. 1 and W. Nelis to May 10 or 20. Best humidity was 78-85%. Slight wilting toward end of storage period is a benefit as the pears ripen better and have better flavor. All pears ripen best at 65°F and in ripening rooms high humidity is essential.

Evens indicated that nears may be frozen to 25° core temp. at 65°F and in ripening rooms high humidity is essential. Exps. indicated that pears may be frozen to 25° core temp. No injury results when pears were thawed between 33° and 65°F if humidity is kept high. Ethylene ripens pears at 65-70° for first few weeks after harvest but not later; it has no effect at cold storage temp.—H. A. Cardinell.

6514. HOWLETT, FREEMAN S. The modification of flower structure by environment in varieties of Lycopersicum esculentum. Jour. Agric. Res. 58(2): 79-117. 9 fig. 1939.—All tomato vars. studied, regardless of origin, showed a definite response to environment in respect to the relative

a definite response to environment in respect to the relative length of the pistil and stamens. Although the length of the stamens varied somewhat, the change in relative length was primarily due to variation in length of pistil. Differences occurred in the degree to which the relative length of pistils and stamens varied in vars. of both American and English origin. In certain vars., such as Break O' Day, the fact that the pistil was enclosed within the staminal cone masked the degree of change induced by the en-vironment. The extent of the change was no less than that shown by Ponderosa whose pistils were always longer than that shown by Ponderosa whose pistils were always longer than the stamens or than that shown by Globe whose pistils varied from a position longer than the stamens to one correspondingly shorter. A classification is presented of a number of vars. on the basis of the relative length of

pistils and stamens. The max. length of pistil in relation to stamens was obtained when the plants were grown during a period of relatively short daylight, under light of low intensity, and with an abundance of readily available N. A moderate elongation of pistil was but a transition stage from the long to the short pistil. A moderately long pistil was produced when the light was of higher intensity than that which favored the development of the long pistil. The short pistil in relation to the stamens was produced when the days were long, the light of high intensity and the supply of readily available nitrogen only moderate. An increase in length of pistils in relation to the stamens appears to be associated with, if not caused by, carbo-

appears to be associated with, if not caused by, carbohydrate deficiency and the degree of change from the long to the short pistil seems to be positively correlated with the degree of deficiency.—F. S. Howlett.

6515. IVERSON, V. E. Fruit cracking of tomatoes as influenced by applying potassium permanganate to soils in which the transplants are grown. Montana Agric. Exp. Sta. Bull. 362. 1-15. 3 fig. 1938.—Applications of KMnO4 at the rate of 0.2 g. per pot to the surface of soil of potator. the rate of 0.2 g per pot to the surface of soil of potted Bonny Best tomato plants resulted in a materially increased evolution of CO₂ during the first 4 days, suggesting that either biol. activity or chemical oxidation, or both, had been increased. Measurements of plants taken 45 days after the treatment showed a significant increase in plant height and stem diam., as compared with the controls. Observations on the roots showed marked stimulation, particularly in the number of fibrous roots. Treatment of other plants with MnCl₂ in equivalent amts. of Mn to the KMnO₄ treatments was followed by an equal stimulation, indicating that Mn was probably the active factor concerned. Field studies with plants set in the open after 70 days in the greenhouse and trained to a single stem showed reduced cracking in the lots which had been treated with KMnO₄ in the transplant stage. That climatic conditions are also a factor in cracking of tomato fruit was indicated in different results secured in 2 successive years differing sharply in rainfall and relative humidity during

the summer period.—Courtesy Exp. Sta. Rec.
6516. LAURIE, ALEX, and G. H. POESCH. Commercial flower forcing. The fundamentals and their practical application to the culture of greenhouse crops. 2nd ed. vii+557p. 49 illus. P. Blakiston's Son and Co., Inc.: Philadelphia, 1939. Pr. \$4.50.—This book deals with commercial practices and application of experimental results in the production of commercial greenhouse flowering plants. The present status of the industry and factors contributing to the changes which have taken place from 1909 to 1929 are summarized from the various U.S. census reports. The fundamentals of greenhouse construction and heating include types of houses, materials for construction, methods of calculating heat radiation, piping, cubical content of the house, types of heating equipment and the repair and upkeep of greenhouses and the heating system. Light and its effect upon plant growth is given with special reference to the effects of day length upon various spp. of plants, includes a list of plants forced to flower earlier or later by the use of additional artificial light and the method of treatment. Discussion of soil types, structure, fertilizer elements and conditions favoring bacterial activity is followed by a thorough treatment of soil testing including method of sampling and details of the mechanics of making the test, proper soil acidity and the interpretation of the tests for the various nutrient elements, methods of soil sterilization, the effects of sterilization and treatment of the soil and soil preparation and fertilization of various crops including the effects of organic materials. Methods of growing plants in gravel and cinders and the equipment involved include a discussion of nutrient solutions and sources of chemicals and other equipment. Tables giving soil reaction, mixture rates of fertilizer application and types of fertilizers to use for various plants appear with the discussion of fertilizers for the major and minor crops. Methods of propagation and diseases and insects and their control are discussed and specific recommendations given in table form. Cost of production and examples of calculating the same appear at the conclusion of the book. Each chapter is supplemented with a list of references related to the subject.—K. Post.

6517. MANVILLE, IRA A., FRANCIS J. REITHEL, and PAUL M. YAMADA. Sources of uronic acid in the apple. Food Res. 4(1): 47-53. 1939.—In the determination of the uronic acid value of Winesap apples by Link's method, it was observed that the pectin content could not account for all the CO₂ evolved. Expts. were then carried out to determine the distribution of CO₂-producing substances in determine the distribution of CO₂-producing substances in the d the apple. Alcoholic and aqueous extraction were employed to separate the various fractions of the apple. The pectin present accounted for only 37.5% of the total CO₂ yield; sugars contributed about 35.7%. The percentage distribution of unavailable carbohydrates is also presented.—I. A. Manville.

6518. NICHOLS, P. F., E. M. MRAK, and R. BETHEL. Effect of drying and storage conditions on color and SO, retention of dried apricots. Food Res. 4(1): 67-74. 1939.— Color and SO₂ retention by dried apricots vary with climatic conditions at the time the fruit is dried. Apricots dried in warm and relatively dry districts retain more SO2 and a better color than those dried in a cool and foggy district. Shade drying decreases the SO₂ retention. SO₂ retention during storage varies with the storage temp., length of storage period and moisture content of the fruit. Atmospheres of air, N, or CO₂ or vacuum do not prevent the decrease in SO₂ content or color deterioration during storage. -Authors.

6519. ROBERTS, J. L. Modern dahlias. 211p. Double-

day, Doran and Co.: Garden City, New York, 1938. 6520. SCHLÖSSER, L. A. Fruchtstandshöhe und Reifungsgeschwindigkeit bei Tomaten. [Fruit height and rapid-

ity of ripening in tomatoes.] Züchter 10(5): 132-136. 1938.
6521. SCHULTZ, ENRIQUE F. Ensayos de Citrus.
[Trials with Citrus.] Rev. Indust. y Agric. Tucuman 28(1/3): 22-45. 1 fig. 1938.—Eight root-stocks were tried for sweet oranges, mandarins, pomelos and lemons. The root of Rangpur lime, all features considered, seemed to be best. Its excellence in the retention of fruits during periods of hot, dry winds was noticeable.—In 6 depth-of-transplanting trials, ranging from 15 cm. above the level of the soil to 30 cm. below, and covering a period of 6 years, the above-level planting gave best results.—Numerous vars, growing and fruiting in the grove of the Station are descr. with characteristics and habits of both fruits and trees (of special interest to citrus growers).—On account of the drought the scale insect attack on Citrus was less severe than in normal years. The infestation augmented somewhat in the latter part of the season probably because their predators, the coccinellids were also diminished. The white fly (Aleurothrixus howardi); the white scale (Chionaspis citri) and the mealy scale (Pseudococcus citri) were especially active. The dry weather favored infestation by 2 spp. of mites, the red and the yellow, starting first on privet hedges and afterwards passing on to the leaves of citrus. The dry weather also had a detrimental effect on the enemies (Opius spp.) of the fruit fly (Anastrepha sp.), only 2 flies per 1000 being parasitized. The citrus tortrix caused much damage to citrus in this region. Brief life-history, habits and remedies are given. A judicious green-manuring program had an ameliorating influence on citrus during dry years. Moisture relationships were improved and the trees were invigorated, thus reducing the effects of adverse influences. Cowpea (Vigna sinensis), velvet bean (Stizolobium deeringianum) and tick-clover (Desmodium tortuosum) are considered best for greenmanure crops.—J. W. Gilmore.

6522. SPURWAY, C. H., and C. E. WILDON. Water

conditioning for greenhouses. Michigan Agric. Exp. Sta. Circ. 166. 1-10. 2 fig. 1938.—A description with discussion as to operation of an apparatus designed for neutralizing the carbonate alkalinity or carbonate hardness of water. The effect of carbonate hardness in water on plants and the underlying principles of water conditioning are discussed. In general, the conditioned water maintained the pH value of the soils at about the same level or slightly lower than did distilled water, and increased markedly the soluble P content of the soils.—J. W. Wellington (courtesy Exp. Sta. Rec.).

6523. SRIVASTAVA, D. N. Studies in the non-setting of pears. II. The effect of weather conditions. III. The effect of the flower characters. Ann. Rept. East Malling Res. Sta. A 21, 25th yr.: 128-153. 1937(1938).—II. Investi-gations concerned with the effect of weather conditions on fruit setting in Conference, Doyenne du Comice and Beurre Hardy vars. are described. Shelter in the form of hop lewing facilitated setting in these vars. and in Dr. Jules Guyot. In certain instances more fruits developed on the south than on the north side of the trees due possibly to more favorable conditions for pollination and pollen tube growth. The triploid variety Pitmaston Duchess seemed particularly susceptible to unfavorable environmental conditions.—III. The size of the flower (corolla spread) in a fully opened flower, relative length of the style and stamens and the amount of dichogamy were studied as factors influencing the set in 4 vars. Although mean diam. of the flowers varied considerably between the vars., Pitmaston Duchess, a triploid, had larger flowers and a smaller percentage setting fruit than the diploid Conference and Beurre Hardy. There was also no relation between the degree of self-fruitfulness of these vars. and the relative length of pistil and stamens. The stigma did not usually become receptive until 2 days after the stigmas were exposed although the observations indicated that this were exposed although the observations indicated that this delay was in part due to weather conditions. The period of receptivity for the vars. was as follows: Conference 4 days, Doyenne du Comice 2 days, Beurre Hardy 3 days, and Pitmaston Duchess 6 or 7 days.—F. S. Howlett.

6524. TRUE, R. H. The horticultural value of native viburnums. Morris Arboretum Univ. Pennsylvania Arboretum Bull. Associates 2(12): 46-48. 1938.

6525. TRUE, R. H. The early days of the Seckel pear.

Morris Arboretum Univ. Pennsylvania Arboretum Bull.

Morris Arboretum Univ. Pennsylvania Arboretum Bull. Associates 2(12): 49-50. 1938.

6526. TYDEMAN, H. M. The influence of different object of the growth and development of the fruit in apples and pears. I. A progress report on experiments carried out during 1937. Ann. Rept. East Malling Res. Sta. A 21, 25th yr.: 117-127, 1937 (1938).—The effect of various pollens upon the rate of growth of the fruits from pollination to maturity in several apple and pear vars. was measured. There were pronounced differences in the size of the fruits resulting from the different pollens shortly after pollination but the differences became progressively less as the season advanced. At maturity the difference in size was usually not significant although in a few instances it attained 10%. In all instances the fruits abscissing were smaller than those remaining. The number of fruits present after the first drop and at maturity varied considerably in different combinations, possibly as the result of different pollens.—F. S. Howlett.

6527. WYMAN, D. Hedges, screens and windbreaks, their uses, selection and care. 249p. McGraw-Hill Book Co.: New York, 1938.

FORESTRY

W. N. SPARHAWK, Editor

(See also in this issue Entries 5291, 5321, 5383, 6447, 6527, 6584, 6618, 6631, 6632)

6528. BOKOR, RESZÖ. Adatok az akácnak nitrogéngyüjtő baktériumokkal való oltásához. [Inoculation of Robinia with Bacillus radicicola.] [With Ger., Fr., and Eng. summ.] Erdészeti Lapok 77(7/8): 623-631. 1 fig. 1938. 6529. BOKOR, RESZÖ. Az ákác oltása nitrogéngyüjtő baktériumokkal és annak gyakorlati vonatkozásai. [Inocu-

lation of Robinia with Bacillus radicicola.] [With Ger., Fr., and Eng. summ.] Erdészeti Lapok 77(9): 711-723. 3 fig. 1938.—Inoculation is necessary for Robinia plantations unless bacteria are present in the soil. The best method is to inoculate the seed before sowing. B. radicicola loses its virulence after living free in the soil for 2 yrs. Bacteria nodules play a correlative rôle in the N supply of the

nodules play a correlative role in the N supply of the trees; where they are lacking, the tree tends to store more N in its terrestrial parts.—W. N. Sparhawk.

6530. FAWCETT, G. L. Notas sobre las siembras de eucaliptos. Rev. Indust. y Agric. Tucuman 28(4/6): 123-126. 1938.—Because of the increasing interest in Eucalyptus as a wind-break and shade tree, the author describes 13 spp. which are believed to be best adapted to the Province. These are:—botryoides, citriodora, corynocalya, microcorys, paniculata, propinqua, resinifera, robusta, rostrata, rudis, saligna, sideroxylon and tereticornis. Then follow detailed instructions on planting and replanting with mention of precautions and hazards.—J. W. Gilmore.

6531. IJJÁSZ, E. Grundwasser und Baumvegetation unter besonderer Berücksichtigung der Verhältnisse in der ungarischen Tiefebene. I-III. [Soil water and tree vegetation, with special reference to their relation to the Plains of Hungary.] Erdészeti Kisérletek [Sopron] 40(1/4): 159-

269. 2 folding maps. 1938.

6532. MEAD, J. P. Annual report on forest administration in Malaya, including Brunei, for the year 1937. 80p. Col. Map, 4 pl. Government Press: Kuala Lumpur, 1938. Pr. \$1.00.—Includes a brief summary of the activities of the forest departments of the several States, with statistics of forest areas, production and export of forest products, and revenues and expenditures.—W. N. Sparhawk.

6533. RABER, ORAN. The history of shipmast locust. Jour. Forest. 36(11): 1116-1119. 1938.—The introduction

of shipmast locust to Long Island from Virginia has been generally credited to a Captain John Sands. A detailed study of the historical evidence for this belief leads the author to conclude that the origin of shipmast locust is

obscure and that when and by whom it was introduced to Long Island is unknown.—Auth. abst.
6534. ROBERTSON, W. A. Note on shifting cultivation in Finland. (From information supplied by Professor Heikinheimo.) Forestry 12(2): 136. 1 pl. 1938.—A century ago Finland exported considerable quantities of rye which were grown under a system of shifting cultivation. Many of the practically pure pine areas occurring in the flatter lands at low elevations are due to natural regeneration of pine from adjoining belts on the abandonment of such cultivated lands. Cultivation rotations fell as low as 20 yrs. near villages and have resulted in belts of pure grey alder, as under such a short rotation the pine had not time to reach seed-bearing age and the natural seedtrees were at too great a distance. Grey alder coppice was the only type of forest which could survive under such short rotations. Rye was sown on the cut and burnt-over land in the autumn, the seed being covered by hoeing or ploughing. . . . The system is being again experimented with as a possible means of ensuring pine regeneration in the moister localities which have been invaded by spruce. where the proportion of pine will decline progressively. In such cases natural regeneration of pine . . . will be insufficient and artificial sowing is adopted, the seed being sown in May following the sowing of the rye.

PHARMACOGNOSY AND PHARMACEUTICAL BOTANY

HEBER W. YOUNGKEN, Editor

(See also in this issue Entries 5271, 6441, 6474, 6711, 6826)

6535. ARIMA, JUNZO, und MAMORU NINOMIYA. Über die Verwendung von Mohnsamen in Manchoukuo. I. [In die Verwendung von Mohnsamen in Manchoukuo. I. [In Jap. with Ger. summ.] Rept. Inst. Sci. Res. Manchoukuo 2(5): 45-46. 1938.—The poppy is abundant in Jehol Province. It is used mainly for opium production, though elsewhere in Asia and also in America, it is raised for production of poppy seed oil. The seed produced in Manchoukuo is yellow to brown, like the Turkish poppy seed; weight per 1000 seed is 0.39 g.; oil content, 43-45%; water content 6.4-7%; ash, Ca 7%; crude protein, 26.87-27.92%; crude fiber, 4.27-6%; and N-free extractives 8.7-10.3%. Oil is extracted by pressing the cold seeds, which yield a light colored oil, acid number 2.1, suitable for cooking; then by pressing the residue at 60-70° C, which yields a dark oil, acid number 5.9, suitable for technical use. The total oil yield amounts to 40.1%.

6536. BALANSARD, J., et M. RAYBAUT. Sur le Salsepareille de Provence (Smilax aspera). Compt. Rend. Soc. Biol. 129(26): 305-308. 1938.—Extracts of this plant

Soc. Biol. 129(26): 305-308. 1938.—Extracts of this plant

have very weak diuretic properties.—J. T. Myers.
6537. BODE, H. R. Das Stern-endothecium als ein wichtiges Erkennungsmerkmal im mikroskopischen Drogen-

bild von Flores Verbasci. Pharmazeut. Zentralh. Deutschland 79(43): 681-683. Illus. 1938.
6538. BONISTEEL, WM. J. The present status of aconite research. Jour. Amer. Pharm. Assoc. 27(6): 480-482. 1938.—The needs of further investigation of various members of the genus Aconitum are cited, and the most effective lines along which research should proceed are laid down

in a general way.—G. M. Hocking.

6539. CHANG, F. C. A crystalline compound from the white powder found on Bambusa chungii. Lingnan Sci. Jour. 17: 617-622. 1 pl. 1938.—From a white powder, which appears on the first-year culms of B. chungu a crystalline compound was isolated, the properties of which indicate it is a triterpenoid ketone, identical with or similar to freidelin. Properties of the compound and methods of prepn. are discussed.—J. A. Trent.

6540. CHEVALIER, A. La marjolaine vraie (Majorana hortensis) et sa culture. Rev. Bot. Appl. 18(204/205): 593-

6541. De WAAL, H. L. On the constitution of the bitter principle "Geigerin." I. The isolation of various degradation acids. Onderstepoort Jour. Vet. Sci. and Animal Indust. 10

(2): 395-410. 2 fig. 1938.—Geigeria aspera (Compositae) contains 2 closely related active substances—a bitter principle, Geigerin (C₁₅H₂₀O₄), and "Vermeeric Acid" (C₁₈H₂₈O₇)—causing vomiting disease. (cf. Rimington, Roets and Steyn, On-derstepoort Jour. vol. 7, pp.485-520. 1936.) Oxidation of Geigerin by means of alkaline KMnO₄ soln. leads to the formation of an acid, $C_{10}H_{14}O_4$, and oxalic acid. The HNO₃ oxidation of Geigerin leads to an acid, $C_{15}H_{18}O_6$, which again on oxidation with alkaline KMnO, soln, also yields oxalic acid. (Acetaldehyde is invariably a by-product of these oxidations.) The C₁₅H₁₈O₆ acid is a monocarboxylic dilactonic acid, which can be saponified with alcoholic KOH to a tricarboxylic acid and is again relactonized with HCl. Geigerin probably belongs to a sesquiterpene class of substances not hitherto observed in nature; this hypothesis would explain the oxidation

m nature; this hypothesis would explain the exidation results by postulating a mechanism similar to that encountered in the camphor-acid group.—H. L. de Waal.

6542. EARLE, K. V. Toxic effects of Hippomane mancinella. Trans. Roy. Soc. Trop. Med. and Hyg. 32(3): 363-370. 2 pl. 1938.—The toxic effect of H. mancinella on man and animals, and the suggested treatment is given. The reaction may be due to an allergy, but is usually due to direct contact. The tree is common in the Barbados.—A. C. Walton.

6543. EBY, FRANK H., FREDERICK M. SCHOLL, and DAVID J. PHILLIPS. A study of Datura stramonium. Jour. Amer. Pharm. Assoc. 27(6): 474-476. 1938.—D. stramonium plants grown under unsatisfactory conditions for the normal development of most plants (viz., in vacant lots in a large city) and in soil made up mostly of the debris from demolished buildings showed a normal growth and an average alkaloidal content. The smallest amt. of alkaloid occurred in fruits (exclusive of seeds); increasing amts. were found in the following order: stems, leaf blades. seeds, petioles, and flowers, which last gave the highest yield.—G. M. Hocking.

6544. EVANS, CLAIRE. A phytochemical study of Kalmia polifolia, Ericaceae. Jour. Amer. Pharm. Assoc. 27(8): 681-689. 3 fig. 1938.—Both the leaves and the stems contained sugars and tannins. The pectins were extracted from the leaves and examined. Steam distillation yielded from the leaves, as well as from the stems, only a trace of volatile oil. Neither the leaves nor the stems gave positive tests for alkaloids when extracted according to the

pharmacopoeial method and treated with alkaloidal precipitants. From the resinous portion of the alcoholic extract of the leaves, 2 substances were obtained which yielded of the leaves, 2 substances were obtained which yielded the color reactions for phytosterols; one, m.p. 128° C, was precipitated with digitonin; the other, m.p. 250°-255° C, was not. The stems yielded only one phytosterol which gave the same tests and melting point as the one from the leaves which melts at 128° C. The glycoside asebotin was present in the leaves but not in the stems. The leaves were extracted with meta-step leaves but not in the stems. were extracted with water, alcohol, chloroform, ether, and benzol; the extracts produced no poisonous symptoms when fed. Oral introduction of the glycoside also was without toxic effect.—C. Evans.
_6545. FELLOWS, EDWIN J., and CLAYTON S. SMITH.

The chemistry of Passiflora incarnata. Jour. Amer. Pharm. Assoc. 27(7): 565-573. 1938.—Chem. analysis of the crude drug disclosed the following constituents: volatile oil; fixed oil (containing myristic, palmitic, oleic, linoleic, and linolenic acids); non-saponifiable fraction (containing melissyl alcohol and sitosterol); a hydrocarbon (possibly triacontane or hentriacontane or dotriacontane); catechol (probably present in a resin); gallic acid; glucose. The last 2 compounds indicated the presence of a glucosidic tannin. The presence of butyric acid and pyrogallol was also indicated. No indications were found of alkaloid. Aqueous extracts of the drug, after purification with lead acetate soln, and removal of the lead, caused a distinct fall in blood-pressure when injected into dogs under ether anesthesia.—G. M. Hocking.

6546. FICHTER, M. [An adulteration of majoran.] Pharmaceut. Acta Helvet. 12: 363. 1937.—The author describes a sample of drug bought under the name of majoran. While it resembled majoran (Origanum majorana) in many characteristics, the leaves were smaller and of a different appearance. The specimen was also examined under the microscope and drawings accompanied by descriptions are included. By comparison with descriptions in several botanical texts, the drug was found to be O. hirtum.—M. F. W. D. (courtesy Jour. Amer. Pharm. Assoc.). 6547. GUHA, P. C., and B. H. IYER. Attempts towards

the synthesis of cantharidin, II. Jour. Indian Inst. Sci. 21A(10): 115-118. 1938.—Condensation of di-eodio-oxalodiglycollic ester with ethylene (trimethylene) dibromide did not yield the expected bio- β -lecto-ester but probably the enolic ether. The corresponding -thio-diglycollic ester yielded a similar enolic ether.— $R.\ H.\ Manske$.

6548. HARPER, S. H. A new compound from Derris elliptica resin. Chem. and Indust. [London] 57: 1059. 1938.

—Properties of this compound suggest its close relation to isorotenone, $C_{23}H_{22}O_6$; its formula being $C_{20}H_{10}O_6$, differing from isorotenone by C_3H_6 . Its mol. wt. (Rast method) is 358, calculated for $C_{20}H_{10}O_6$, 352. Crystallization from alcohol gives clusters of long needles, m.p. 180°. It gives a strong blue color in Durham test, is ketonic but non-heading is not isomewized by H.SO, and forms a value. phenolic, is not isomerized by H2SO4, and forms a yellow

dehydro compound. Its origin is obscure.—E. J. Umberger. 6549. HENRICI, M. Some physiological aspects of the genus Tribulus. Onderstepoort Jour. Vet. Sci. and Animal Indust. 10(2): 367-392. 1938.—In connection with the pathogenesis of Geeldikkop caused by spp. of Tribulus and other similarly acting plants, the pigments of *Tribulus* were investigated. The normal plant contains the usual chlorophyll a and b, lutein, violaxanthin and carotene, although the ratio of green to yellow pigments is high; wilted plants collected during an outbreak of Dikkop contain an unknown, unstable carotinoid, showing absorption bands in ether between 5350 and 5570 mµ. Stored for a few days, no trace of this pigment is found, but zeaxanthin is present. From the same wilted plants, break-down products of chlorophyll can be isolated, phæophytin and others, soluble in dilute acid. During wilting apparently first the carotinoids and then the chlorophylls are destroyed. T. terrestris is at times an excellent fodder plant, due to

its high content of P. It is a nitrate plant, and contains at times a large amount of oxalic acid not bound to Ca., although the latter is abundant in the plant. Anatomically the leaves reveal nothing striking; chiliferous vessels, containing resin, and lysigenous or schizogenous ducts are absent which is noteworthy as probably the active poison of the *Tribulus* is a resinic acid which must be formed in

the plasma of ordinary cells.—M. Henrici. 6550. LEIGH EVANS, K., and L. E. ARNOLD. Experimental studies of poisoning with ackee (Blighia sapida). Trans. Roy. Soc. Trop. Med. and Hyg. 32(3): 355-362. 1 pl. 1938.—Using kittens and guinea pigs, the authors show that the aril of the ackee decreases in toxic effects as it matures and the ackee opens. The toxicity varies inversely with the fat content, the phytosterol fixing the haemolytic toxin, which seems to be saponin.—A. C. Walton.

6551. LEONARDO, DONATELLI, e CISBANI LIA. Raffronti tra dosaggio chimico e dosaggio biologico degli

alcaloidi della radice di belladonna toscana, jugoslava e bulgara. [Comparison between the chemical and biological dosage of the alkaloids of the root of Tuscanian, Jugo-slavian, and Bulgarian belladonna.] Arch. Ital. Sci. Farmacol. 7(5): 324-353. 10 fig. 1938.—A study was made of the activity of the alkaloids in the root of belladonna plant grown in various parts of Southern Europe. Psychiatrists had found that clinically the Bulgarian extract had a therepositic effect on Poskinsonian engage like not had a therapeutic effect on Parkinsonian encephalitis not accounted for by the content of atropin. By the method of Rothlin using the paralyzing effect on the vagus nerve of the rabbit, the biological test gives an activity of the drug in terms of atropin for the Italian belladonna as 208%, the Bulgarian 2.41%, Jugoslavian 2.03%, while the chemical titration gives respectively, .36%, .47%, and .43%. The galenical preparation is considered to be more effective therapeutically than equivalent amounts of atropin. The

alkaloid in the root is increased in summer.—K. K Jones. 6552. METELMANN, JOACHIM. Über Behandlung der durch Gelbkreuzkampfstoff gesetzten Hautwunden mit Kamille. Arch. Exp. Path. u. Pharmakol. 191(2): 263-265. 1938.—Prior studies have shown chloramine treatment useful in promoting the healing of lesions caused by yellow cross war gas (dichlorodiethylsulfide). The juice of *Matricaria chamomilla* (German camomile; Kamillosan-liquid) was found useful in healing lesions produced on the rabbit ear by this war gas. It was also useful in a salve preparation. It was no better than but no less effective than chloramine. -C. S. Leonard.

6553. RABATÉ, J. Étude des essences de Lippia adoensis

Hochst. Rev. Bot. Appl. 18(201): 350-354. 1938.
6554. RABATÉ, J., et A. GOURÉVITCH. Analyse des fruits et des feuilles de Bauhinia reticulata D.C. Sur la présence de grande quantités d'acide 1. tartrique. Rev. Bot. Appl. 18(204/205): 604-612. 1938.

6555. RONDININI, R., e G. TONINI. Prove comparative di concimazione sull'erba medica. [Fertilizer tests with drug plants.] *Italia Agric.* 75(5): 333-337. 1938.
6556. SCHLOSSBERGER, H. Chaulmoograöl. Geschichte,

herkunft, zusammensetzung, pharmakologie, chemotherapie.
141p. J. Springer: Berlin, 1938.
6557. WORK, THOMAS SPENCE, FRANZ BERGEL, and
ALEXANDER ROBERTUS TODD. The active principles
of Cannabis indica resin. I. Biochem. Jour. 33(1): 123-127. 1939—p-Nitrobenzoylation of the high-boiling pharmacologically active resin from the \$\Pi\$ flowers of Cannabis sativa yields crystalline cannabinol p-nitro-benzoate and a mixture of resinous esters. Cannabinol is highly toxic and gives a completely negative reaction in the Gayer hashish test on rabbits, while the hydrolysis product of the resinous esters gives a strong positive reaction and is less toxic than cannabinol. The material giving a positive Gayer test has been fractionated by adsorption methods and a product obtained showing a positive Gayer test in rabbits in a dose of 0.25 mg. per kg. body wt.—A. R. Todd.

PLANT PHYSIOLOGY, BIOCHEMISTRY, AND BIOPHYSICS

F. E. DENNY, Editor

(See also in this issue Entries 5398, 6024, 6258, 6261, 6269, 6270, 6271, 6295, 6311, 6337, 6445, 6451, 6454, 6464, 6467, 6475, 6486, 6505, 6508, 6512, 6514, 6515, 6516, 6517, 6522, 6648, 6649, 6664, 6666, 6669)

GENERAL

6558. LOEHWING, WALTER F. Physiological aspects of sex in angiosperms. Bot. Rev. 4(11): 581-625. 1938.—Review of oxidation potential and oxidases, nutrition, temp., vernalization, light, sex reversal, hormones, and parthenocarpy.—L. Benson.

ABSORPTION, NUTRITION

6559. GREGORY, F. G., and E. K. WOODFORD. An apparatus for the study of the oxygen, salt and water uptake of various zones of the root, with some preliminary results with Vicia faba. Ann. Botany 3(1): 147-154. 1 pl., 1 fig. 1939.—An apparatus is described and figured by means of which the uptake of O₂, salts and water may be quantitatively studied in adjacent segments of an intact root. There is a steep gradient of metabolic activity and of N uptake along the root, the apical segment being most active. In light, O₂ uptake at apex, 36×10^{-6} cc./mm.³/hr.; at base, 9×10^{-6} . N uptake at apex, 36×10^{-6} mg/mm.³/hr.; at base, 5×10^{-6} . Relative rate of water uptake in different zones varies greatly even during a short-period expt.—F. G. Gregory

6560. HOAGLAND, D. R., and D. I. ARNON. The water-culture method for growing plants without soil. California Agric. Exp. Sta. Circ. 357. 1-39. 4 pl., 7 fig. 1938.—A brief history of the use of the water-culture method is included. Water-culture technique is described and a series of formulas for making nutrient solns. is given, in both popular and scientific terms. Expts. are cited in which tomato plants were grown in a greenhouse under comparable cultural conditions, in soil and water-culture media. No marked difference was found in yields of tomatoes on a unit surface basis between plants grown by the 2 methods. Certain possibilities for commercial use of the water-culture method in greenhouses producing high-priced crops are noted, but attention is called to economic limitations in the use of the water-culture method and to the immense amount of misleading publicity which has been given recently to proposed commercialization of this method.—D. R. Hoagland.

6561. HOFFER, G. N. Potash in plant metabolism. Deficiency symptoms as indicators of the role of potassium. Indust. and Engineer. Chem. 30(8): 885-889. 1938.

6562. PIRSCHLE, K. Die Bedeutung der Spurenelemente für Ernährung, Wachstum und Stoffwechsel der Pflanzen. I. Li, Na, Rb, Cs, Be, Sr, Ba, B, As, Sb, Bi, Se, Te, Mo, W. Ergeb. Biol. 15: 67-165. 1938.

6563. SOLARI, E. La legge di Mitscherlich e le sue applicazioni pratiche. [Mitscherlich's Laws and their practical applications.] Indust. Saccarifera Ital. Boll. Mens. 31 (6): 274-282, 1938.

6564. WATTS, VICTOR M. Anatomical symptoms of nitrogen, phosphorus and potassium deficiencies in seedling hypocotyls of tomato (Lycopersicum esculentum Mill.). Arkansas Agric. Exp. Sta. Bull. 366. 1-32. 5 fig. 1939.—Measurements were made of camera lucida drawings of hypocotyl cross sections from 2 series of small tomato plants that had been subjected to deficiencies of N, P and K. Deficiency symptoms were apparent in all plants before samples were taken. N and P deficiencies resulted in low proportions of conducting tissues to total hypocotyl tissues, in high proportions of phloem to xylem, and in low proportions of internal to external phloem. When the plants were grown in the short day, weak light period of winter, K deficiency was followed by higher proportions of conducting tissues to total hypocotyl tissues than were found in any other treatment; when the plants were grown in late spring and early summer the proportions were similar to those found in plants that received complete nutrient solns. N and P deficiencies resulted in small cells in all tissues, limited amounts of cambium, and thin walled cells in the

woody tissues, as compared to plants of the complete nutrient and potassium deficient treatments.—V. M. Watts.

AUXINS, GROWTH SUBSTANCES

6565. De ROPP, R. S. Studies in the vernalisation of cereals. IV. The effect of preliminary soaking of the grain on the growth and tropic responses of the excised embryo of winter rye. Ann. Botany 3(1): 243-252. 3 fig. 1939.-Grains of rye were soaked for various periods in water, the embryo then excised and transferred to agar (0.7%) with nutrient salts (White 1934) and 3% sucrose, on which their growth and tropic responses were studied. The duration of soaking the grain leads to increase in growth rate, the maximum effect being reached after 2 hours of soaking prior to excision. Even after 20 days the soaking effect is evident. Tropic responses occur in embryos taken from dry grain even on plain agar, but are increased by addition of sugar and by time of soaking the grain before excision. Production of lateral roots, and anthocyanin, are also affected by soaking time. The preliminary soaking evidently leads to transfer of auxin and a "regulator" to the embryo from the endosperm and the aleurone layer respectively. F. G. Gregory.

6566. GOODWIN, RICHARD H. A comparison of two quantitative Avena techniques in the determination of 3-indole acetic acid. Amer. Jour. Bot. 26(2): 74-78. 1939.— The accuracy and utility of the Avena test in the quantitative detn. of 3-indole acetic acid as carried out by Went with water-cultured plants and by Boysen Jensen with soil-cultured plants, were studied. Each method offers certain advantages. In a laboratory with no facilities for precisely controlling the humidity of the constant-temp. dark room, Boysen Jensen's test with soil-grown plants may be most simply, accurately, and expeditiously used; in a completely air-conditioned dark room, Went's test with water-cultured plants can be more speedily executed and more readily standardized and modified.—R. H. Goodwin.

simply, accurately, and expeditiously used; in a completely air-conditioned dark room, Went's test with water-cultured plants can be more speedily executed and more readily standardized and modified.—R. H. Goodwin.

6567. HAVAS, LASZLÓ J. Is colchicine a "phytohormone"? Growth 2(3): 257-260. 1938.—(1) Radicles of radish germinated in a 1/1000 colchicine soln. formed "tubers." (2) When 5/1000 aq. soln. of colchicine was rubbed on (a) the upper, or (b) the lower surface of leaves of young tomato plants, it produced in a an epinastic response lasting 4-6 hrs., in b a less prolonged, less intense hyponastic response. (3) Zebrina pendula stems sprayed with 1/2000 aq. soln. showed, within 15-25 min., a strong epinasty, falling off progressively in intensity as the treatment was repeated over a 6-weeks period. (4) In its effect on the formation of abscission layers around traumata (perforations) in cherry laurel, Hamamelis or Viscum leaves, colchicine acted in a manner analogous to "Traumatin" or Haberlandt's "wound hormone." (5) In its action on growth of yeast or Penicillium, colchicine resembles Bios or Vitamin B. (6) In the Pea test of Went, colchicine fails to give an auxin effect. The first 4 points suggest that it is a growth hormone, the last 2 tend to an opposite conclusion.

6568. ITZEROTT, D. Die Wirkung Wuchsstoffhaltiger Substanzen junger Maispflanzen auf das Wachstum von Ustilago zeae. Arch. Mikrobiol 9(3): 368-374. 1938.—Extracts of young maize plants increase the growth of U. zeae in a medium containing dextrose as the only organic compound. Coleoptile extracts are particularly active. Neither s-indolylacetic nor ascorbic acid exert a comparable effect.—H. A. Barker.

6569. PFAHLER, FRIEDRICH. Versuche über die Wirkung zusätzlicher Auxin- (Heteroauxin-) gaben auf das Wachstum intakter Pflanzen. Jahrb. Wiss Bot. 86(5): 675-719. 1988.—β-indole acetic acid and various other substances with similar auxin-like action may penetrate through the epidermis of the intact plants (Epilobium, Clarkia, Veronica, Mentha, Oenothera, Impatiens) and induce increased growth in most of these plants. The reaction time for strong

aqueous concs. of \beta-indole acetic acid was found to be 20-25 min. In effect on cell extension, α-naphthyl acetic acid was most marked, then β -indole acetic acid and indole butyric acid (these two being equal), and finally β -indole propionic acid. Phenyl acetic acid, phenyl propionic acid and ascorbic acid had no growth accelerating effect, applied under these conditions. Similarly simple organic acids (acetic, butyric) produced no increased extension, so that effect is not due to increasing the acidity of the cells. Increased extension is not produced where natural cell extension has ceased; actually the effect of the dose of auxin on the growth of the intact plant may be analyzed into 3 components: (i) an acceleration of normal processes—which will follow later in the control; (ii) an increase (in weak and average concs. of auxin)—the treated plant has a slightly greater length, somewhat longer side shoots, and slightly higher dry weight; (iii) a retarding effect which is shown on longer application of heteroauxin in concs. about 1:10,000—shown in smaller leaf surfaces and shorter side shoots and, at higher concs., in a reduction of length growth and of flower formation.—Application of auxin to the intact coleoptile of Avena sativa is followed by 2 growth increase effects, the 1st due to increased coleoptile growth, the 2d to increased mesocotyl growth.—J. H. Priestley.
6570. ROBBINS, WILLIAM J., and MARY BARTLEY

SCHMIDT. Preliminary experiments on biotin. Bull. Torrey Bot. Club 66(3): 139-150. 1939.—A means of estimating amounts of biotin in natural materials from the growth of Ashbya gossypii based on data from Kögl and Fries is described. The amount of biotin in a sample of liquid manure was found to be 150,000 γ per g. of dry weight; unfiltered syrup, cerophyl and dried egg yolk contained about 600 units; other substances contained smaller quantities. The amount of biotin decreased with the purity of the sugar samples tested. Neither pantothenic acid nor vitamin B_0

was found to replace biotin.-W. J. Robbins. 6571. SCHAFFSTEIN, GERHARD. Untersuchungen über die Avitaminose der Orchideenkeimlinge. Jahrb. Wiss. Bot. 86(5): 720-752. 1938.—The vitamin, found by Burgeff to be necessary for the development of seedlings of Vanda, was present in the organs of nearly all the higher plants investigated: different seeds were particularly rich in it. The action of the vitamin might be masked by the presence of other substances which acted injuriously and which could be removed by treatment of the plant extracts with animal charcoal; the injurious substances then passed through as filtrate, the vitamin being absorbed on the charcoal from which it could be removed by washing in weak alcohol. The vitamin was not precipitated by Pb acetate, either in acid or alkaline soln. The extracts purified by carbon treatment were active in a conc. of 1:1,000,000. Their optimal activity was at 1:100,000 but at the strongest concs. no harmful effect was found. The harmful effect noted by Burgeff in supra-optimal concs. of yeast extract was due to other substances which could be removed by the charcoal treatment. Phalaenopsis seeds contain only a small quantity of the active substance, but the green seedlings are relatively rich. Bios-containing prepns., such as lecithin, which suffice for the growth of the bios-needing yeast in synthetic media, are without action on *Phalaenopsis* seedlings; the vitamin of *Vanda* is not identical with bios (biotin). Anatomical examination showed that deficiency of vitamin resulted in death of the meristem of the growing point; the already dif-ferentiated cells remain alive for a long time. Starch accumulation, large plasma content and abnormal nuclear size are explained as hypertrophied conditions resulting from the fact that nutrient supplies are not being diverted to the

meristem.-J. H. Priestley. 6572. SCHOPFER, W. H., and S. BLUMER. Untersuchungen uber die Biologie von Ustilago violacea (Pers.) Fuck. II. Wirkung des Aneurins and anderer Wuchsstoffe vitaminischer Natur. Arch. Mikrobiol. 9(3): 305-367. 15 fig. 1938.—Addition of aneurin enables U. violacea to grow in a synthetic medium. The pyrimidine and thiazol components of aneurin are also active, but not other substituted pyrimidines or thiazols, nor thiochrome and related substances. The opt. conc. of aneurin depends upon time of incubation, size of inoculum and other factors; it varies from 0.004γ to 0.02γ for 25 cc. of medium. The aneurin

is removed from the culture medium; about 0.0004 γ is required for the synthesis of 1 mg. dry weight of cells. Various sugars, sugar alcohols and glucosides, but not amino acids, are suitable as C and energy sources. Ammonium salts and numerous amino acids, but not nitrate, can furnish N. The stimulation of growth by saponin, previously reported, is probably due to its content of aneurin. 10 other spp. of *Ustilago* were tested for their aneurin requirements. Seven of these, *U. zeae*, *U. tritici*, *U. levis*, *U. nuda*, *U. hordei*, *U. avenae* and *U. bromivora*, grow without any vitamin. That they synthesize aneurin or its components is shown by the subsequent growth of *U. violaceae* with extracts of these organisms (grown on aneurin-free media). U. longissima and U. violacea v. dianthi deltoidis require aneurin or its components. U. scabiosae develops only with the

complete aneurin molecule.—H. A. Barker.
6573. TEMPLEMAN, W. G. Plant hormones or growthpromoting substances with some horticultural applications. 23p. Hayes, Middx., England, [1937?] (Guild of trade horticulturists. Publication no. 2).

6574. THIMANN, KENNETH V., and JAMES BONNER. Plant growth hormones. Physiol. Rev. 18(4): 524-553. 1938. -Methods generally used for the determination of plant growth hormones are the amount of curvature produced in the Avena coleoptile by a unilateral application of the active substance, the straight growth method, and the slit stem method. Substances active in these tests are called auxins. Centers of auxin formation include many seeds, the tip of the oat coleoptile, buds, young leaves, and possibly root tips. The transport of auxin from these centers of formation is polar, i.e., from the apex of the organ to the base. Auxins are active in asymmetrical growth, i.e., tropisms, in the formation of swellings (these being in part the result of cell division), possibly in the normal growth of roots, in the formation of lateral roots, in the growth and swelling of ovaries and the production of fruits, in the growth of buds, in the inhibition of the development of lateral buds, and in the development of roots on cuttings. Accessory substances other than auxins have been found to have a growth-promoting effect: yeast extract, vitamin B-1, and various amino acids for isolated tomato and pea roots; biotin, pantothenic acid, lactoflavin, nicotinic acid, vitamin C, oestrogenic substances and vitamin B-1 for excised embryos, vitamin C for the shoot, and pro-vitamin A for the formation of roots on cuttings. No saturated substance has shown auxin activity; the introduction of methyl groups reduces the activity greatly. Plasticity of the cell wall is increased by auxin. Certain evidence associates the action of auxin with an oxidation process.—B. Scheer.

6575. WEILER, M. Das Verhalten der Wurzeln unter der Einwirkung von Wuchstoffen der Avena- und der Zea-Koleoptilspitzen. Bull. Internat. Acad. Polonaise Sci. et Lettr. Cl. Sci. Math. et Nat. Sér. B: Sci. Nat. (I) [Bot.] 1938(1/5): 1-31. 1 pl., 2 fig. 1938—Growth-promoting substance (g.p.s.) from the coleoptile tips of Avena was applied to the tips of roots of Lupinus luteus: \(\frac{1}{2}\) col., had no effect; \(\frac{1}{2}\)-3 col., negative curvatures (increased uni-lateral growth-rate); \(\frac{1}{2}\)-6 col., no effect; \(\frac{1}{2}\)-6 col. positive curvatures (decreased uni-lateral growth-rate). Roots of Zea mays behaved similarly. G.p.s. from coleoptile of Zea evoked same kinds of responses of root-tips of L. l. and of Zea. Amounts of g.p.s. small enough to evoke only negative curvatures of L. l. and of Zea, had no effects on roots of peas. If amounts were large enough, positive curvatures resulted. G.p.s. from Avena coleoptiles was applied to the basal cutsurface of roots of L. l.; the effect depended upon whether the roots had been decapitated or not. Decapitated roots behaved almost the same as if the roots were intact and g.p.s. had been applied at the tip. (This is evidence that g.p.s. is translocated up and down the root). If the root possesses a tip (has not been decapitated) its behavior is not determined by simple summation of the amounts of g.p.s. from its own tip and of that absorbed by the cut base. If the effects were due to simple summation, according to the amount of g.p.s. that was added, stronger or more rapidly completed positive curvatures would be expected. Instead, if amounts less than 1 col. are used, the curvatures, though positive, are weaker the more g.p.s. is added. If 1-2 col. of g.p.s. is applied to the cut base, the roots remain

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But if more than 3 col. of g.p.s. is used, continually positive curvature result. These results may be indicate that g.p.s. from Avena coleoptiles and the root-tips of L. l. act with complete indeas if their natures were totally different. This is escapable conclusion, however; if the g.p.s. from from Zea coleoptiles is assumed to be precisely from the root tips of L. l., the explanation of the the expt. with the non-decapitated roots might ie g.p.s. from tip and base do not affect the same of the growing zone, or that they do not affect it ously. Expts. to determine the effects of different of g.p.s. derived from root tips and applied to the cut root of the same kind, are being undertaken .-

VENT, F. W. The dual effect of auxin on root Amer. Jour. Bot. 26(1): 24-29. 1939.—The effect auxins and non-auxins was tested on etiolated cuttings. When the auxins were applied from pological tip of the cutting then the effectiveness ferent substances was a function of their trans-On pea stems phenyl acetic acid was not, by ot forming substance; but if a phenyl acetic acid was followed by an indole acetic acid treatment. formation might be obtained. This is due to the there are at least 2 successive reactions involved rmation, of which the 2d cannot be induced by setic acid. A number of substances completely n causing growth produced this first reaction. In of indole acetic acid the root formation is due to 2 successive reactions. The first reaction probably the accumulation of rhizocaline, and the 2d reactivation.—F. W. Went.

WENT, F. W. Some experiments on bud growth. ar. Bot. 26(2): 109-117. 1939.—The tips of etiolated ts were cut off and replaced by a supply of indole-ad or other compounds dissolved in lanolin. With er cones, inhibition of the lower lateral buds was , which was the more complete the further the as removed from the bud. Other expts. showed inhibition was due to a diversion of the bud factors towards the auxin supply. It could be that simultaneous with accumulation of bud factors near the applied auxin the growth of lateral s inhibited. Some preliminary expts. showed that ibition in roots can be brought about in the same in stems, and that bud inhibition is a similar pheon in both roots and shoots.—F. W. Went.

WITSCH, HANS v. Untersuchungen über die immbarkeit plagiotrop und positiv geotrop reagierender de durch zusätzlichen Wuchsstoff. Jahrb. Wiss. Bot. : 1-44. 1938.—Under the influence of growth substances In applied on all sides to Tradescantia shoots, the ive component of plagiotropic growth is repressed and prolonged treatment negative geotropic curvatures r. These curvatures correspond with those in response alts of heavy metals, if not more than 4 hours intervene than a polication and response. Similarly side roots show the substance calls and in solve of the contraction and response. gros per tme reaction in growth substance solns, and in solns, of of heavy metals. Orthotropic main roots of Phaseolus informs, Brassica napus, Helianthus annuus and Lepidium also show negative geotropic reaction on all-sided on of growth substances. Here also, expts. with rape howed that the time of commencement of the reon is of outstanding importance. Direct observation of with rate in the main root of rape showed that during ame period in which the negative geotropic curvatures loped the length growth of the roots is not markedly tenced by the exptl. solution. After this time the exsion growth is momentarily increased, subsequently to ceed, during the 16 hours it was under observation, at De original speed. One-sided application of β -indol acetic paste acts as on orthotropic shoots: it produces nager growth of the treated flank. The growth substance ranslocated in the *Tradescentia* shoot, in the basal directions of the tradescential shoots. usually, but under suitable exptl. conditions conduction he opposite direction can be observed. Growth subace prepris, are much reduced in activity by addition of nurate solns. Even under long action of Cu salts, how-

ever, the organ continues to secrete its own growth substance; thus Avena coleoptiles after 24 hours in Cu solns. still secrete growth substances at the apex and show considerable extension growth while immersed in the Cu soln. J. H. Priestley.

6579. ZIMMERMAN, P. W., and A. E. HITCHCOCK. Activation of cinnamic acid by ultra-violet light and the physiological activity of its emanations. Contr. Boyce Thompson Inst. 10(2): 197-200. 1 fig. 1939.—Commercial cinnamic acid (phenylacrylic acid) is less active as a plant growth substance than naphthaleneacetic acid or indoleacetic acid. Ultra-violet irradiation increased the physiol. activity of cinnamic acid by converting the trans form to the cis form. When applied to plants as water solns. or lanolin prepns. the converted form induced curvatures of stems and epinasty of leaves as is characteristic for crystalline growth substances and unsaturated hydrocarbon gases. Also the vapors arising from the cis cinnamic acid induced epinasty of leaves and bending of stems similar to ethylene gas when plants were enclosed in bell jars with the chemical. -P. W. Zimmerman.

PROTOPLASM

6580. MARSLAND, DOUGLAS A. The mechanism of protoplasmic streaming. The effects of high hydrostatic pressure upon cyclosis in Elodea canadensis. Jour. Cell. and Comp. Physiol. 13(1): 22-30. 2 fig. 1939.—With increasing hydrostatic pressure the rate of protoplasmic streaming in the cells of E. canadensis diminishes regularly. Abolition of the streaming occurs between 400 and 450 atm. This effect is freely reversible provided the higher degrees of compression (above 400 atm.) are not maintained for more than hr. When the decompression is by steps, the rate of streaming previously observed at a certain pressure is resumed within 1-2 mins. of the partial decompression. retardation of streaming appears to be closely related to changes which the pressure induces in the protoplasmic consistency, as measured by the centrifuge method. The interpretation of these results is based on the proposal that cyclosis is motivated by a cycle of sol-gel reactions and consequently is a phenomenon fundamentally related to amoeboid movement.—Auth. (courtesy Wistar Bibl. Serv.).

OSMOSIS, PERMEABILITY

BORRISS HEINRICH. Plasmolyseform Streckungswachstum. Jahrb. Wiss. Bot. 86(5): 784-831. 1938. —Comparative expts. on forms and times of plasmolysis were carried out on leaves of different age of *Helodea densa* and H. crispa. The leaf cells of H. densa showed, with increasing age, quicker balling-up of protoplasts, KCl and CaCl. giving similar appearances in concs. from isotony to average hypertony. Older cells showed, in a few minutes, perfect convex plasmolysis. The leaf cells of *H. crispa* showed in the end phase of their extension growth a minimal effect on form of plasmolysis. The fully extended cells retained for a long time the concave plasmolysis form. The leaf vein cells of H. densa showed a periodic alteration in form response to plasmolyzing agents which had no connection with the degree of cell extension. KCl and CaCls solns, acted differently on young cells of H. crispa: in KCl solutions the protoplasts rounded themselves rapidly as result of their high K permeability; with progressive differentiation, the limiting layers became to a large degree impermeable to K salts.—J. H. Priestley.

6582. TAMIYA, HIROSHI. Zur Theorie der Turgordehn-

ung und über den funktionellen Zusammenhang zwischen den einzelnen osmotischen Zustandgrössen. On the theory of turgor tension and the functional connection between the separate osmotic quantities. Cytologia 8(3/4): 542-562. 9 fig. 1938.

GERMINATION, DORMANCY

6583. BARTON, LELA V. A further report on the storage of vegetable seeds. Contr. Boyce Thompson Inst. 10 (2): 205-220. 4 fig. 1939.—The life-span of lettuce, onion, and cauliflower seeds stored at room temp. could be prolonged markedly by adjustment of moisture contents to 6-8%. Reduction in moisture content also proved beneficial for seeds of tomato and carrot if sealed containers were

used at room temp. but these seeds also remained viable in open containers. Seeds of eggplant indicated a response similar to those of tomato and carrot, although the former, air-dry, remained viable much longer in sealed storage. Although reduction in moisture content delayed deterioration of pepper seeds at room temp., results indicated that low temp. was necessary for successful storage for periods longer than 4 years. Germination tests of old and fresh seeds stored for short periods at various humidities and temps. indicated that with relative humidities of 50% or lower, the temp. may be as high as 35° C for seeds with high germination power and the storage period as long as 3 months without serious impairment of germination. At relative humidities above 50%, however, safe storage temps. were 20° C or lower. This is of practical importance in commercial packeting of seeds after removal from favorable storage conditions. Pre-treatment of lettuce seeds on a moist medium at 25° C or below permits germination at high temps. which are ordinarily prohibitive. Pre-treated seeds may be dried at room temp. for at least 3 days after which a germination of 50% can still be obtained at 30° C, and 25% at 35°. Seedlings of carrot, eggplant, onion, tomato, and lettuce grown from 6-year-old seeds which had been stored under favorable conditions for retention of vitality showed normal vigor in further growth. A slight initial retardation of growth was noted in cases of un-

favorable storage conditions.—Auth. summ.

6584. BARTON, LELA V. Storage of elm seeds. Contr.

Boyce Thompson Inst. 10(2): 221-233. 3 fig. 1939.—Seeds with a moisture content of 7% proved superior in germination and the second states of the second superior of the second supe tion capacity to those with 8% after storage in sealed containers at room temp. An atmosphere of O2 proved especially deleterious when both moisture content and storage temp. were high. A vacuum served to prolong vitality in cases in which other storage conditions were unfavorable. Elm seeds can be kept viable for at least 16 months by sealing in containers kept at 5° C or below. Different seed lots vary both in initial germination capacity and in keeping quality under various conditions.—L. V.

Barton.

6585. MILLER, LAWRENCE P. Synthesis of β -(2chloroethyl)-d-glucoside by potato tubers treated with ethylene chlorohydrin. Contr. Boyce Thompson Inst. 10(2): 139-141. 1939.—The acetylation of preparations of the Clcontaining β -glucoside formed by potato tubers from absorbed ethylene chlorohydrin yielded β -(2-chloroethyl)-dglucoside tetraacetate. The glucoside formed by the tubers is thus β -(2-chloroethyl)-d-glucoside and is identical with the glucoside formed by gladiolus corms treated with ethylene chlorohydrin.—Auth. summ.

6586. SCHROEDER, ELTORA M., and LELA V. BAR-TON. Germination and growth of some rock garden plants. Contr. Boyce Thompson Inst. 10(2): 235-255. 1939.— Campanula barbata, C. garganica, Hypericum coris, Pent-stemon ambiguus, and Primula pulverulenta germinated well over a wide range of controlled temps. Draba aizoides, Gentiana lagodechiana, Mimulus langsdorfii, and Primula denticulata also germinated well over a fairly wide temp. range. At temps. as high as 25° or 30° C, however, fewer seedlings were produced. Tests in light and dark at these unfavorable temps. showed that the presence of light induced germination. This points to the need of some pretreatment for germination at certain temps. Low-temp. pre-treatment was used instead of light to bring about germination of Gentiana lagodechiana seeds at unfavorable temps. No germination of Primula obconica and Ramondia pyrenaica occurred even at favorable temps. without light. Calochortus macrocarpus, Camassia leichtlinii, and Lewisia rediviva produced seedlings at 5° C within 2-3 months after planting. This low temp. was necessary for germination and not for breaking dormancy. When Cytisus decumbens was treated with conc. H₂SO₄ for from 15 to 45 min., a good percentage of seedlings was produced. Draba alpina and Meconopsis cambrica produced good stands of seedlings in the spring if planted in the fall and kept in cold frames over winter.-Auth. abst.

6587. SHEPHERD, HAROLD R. Studies in breaking the rest period of grass plants by treatments with potassium thiocyanate and in stimulating growth with artificial light.

Trans. Kansas Acad. Sci. 41: 139-153. 9 fig. 1938.—Sods of 5 native grasses were brought into the greenhouse in the early fall and treated with KSCN of varying cones. to break the rest period. Half of the plants so treated received sunlight of normal winter, day-length duration; in the other half the sunlight was supplemented by artificial light to simulate the normal day-length of summer. The rest period of sods of some of the species treated with the chemical was broken. The growth of those grasses on which the rest period was broken was greatly stimulated by artificial light.—Author

6588. SMITH, D. C. Influence of moisture and low temperature on the germination of hop seeds. Jour. Agric. Res. 58(5): 369-381. 1939.—Seeds of 4 common vars. of Pacific Coast hops (Humulus lupulus) and numerous seedlings were subjected to combinations of natural and artificially controlled moisture and temp. conditions and subsequent effects upon % of germination were observed. While germinability was often below 10% in untreated lots, that of treated series attained a figure as high as 80%. 5 days' incubation in a standard germination chamber followed by 5 weeks' refrigeration at 5° C resulted in highest germination among the treatments used. Varietal differences in reaction to temp. and moisture treatments were not established. Seed lots from individual seedling plants varied markedly in germinability. Differences in vigor of seedling plants due to treatments were not noted. Under field conditions climatic factors act to overcome "dormancy" or to promote the after-ripening process, the nature of which was not studied.—D. C. Smith.

6589. THORNTON, NORWOOD C. Carbon dioxide storage. XIII. Relationship of oxygen to carbon dioxide in breaking dormancy of potato tubers. Contr. Boyce Thompson Inst. 10(2): 201-204. 1939.—CO2 is most effective in breaking the dormancy of potato tubers when it acts in the presence of 20% or more of O2 and this treatment is more effective than a completely anaerobic condition brought about by treatment with N_2 . The opt. concs. of CO_2 are 10-60% in combination with 20-80% of O_2 which will, with a period of 5-7 days of treatment, cause the emergence of sprouts from 50% of one-eye pieces in soil within 17-30 days as compared with 44-78 days for the controls.—N. C. Thornton.

GROWTH, DEVELOPMENT

6590. OKABE, YASUYUKI. Studies on the regeneration curve of mulberry trees. Bull. Sericult. and Silk Indust. [Japan] (Sanshi-Gaku Zasshi) 10(4): 272-275. 1938.—The growth of accessory buds on the stem is promoted by removal of the terminal bud of mulberry shoots. In comparison with the standard normal growth curve as determined by Robertson's (1923) formula $\log x/A - x = K^{(t-t_1)}$, the regeneration of the accessory buds is rapid and varies as the temp. and moisture.—C. S. Gibbs.

6591. SCHOPFER, W. H. La pyrimidine (2-méthyl-4-amino-5-amino-méthylpyrimidine), facteur de croissance des microorganismes (Rhodotorula, Mucorinées, Dematium). Protoplasma 31(1): 105-135. 6 fig. 1938.—The influence of aneurin (vitamin B₁) and its constituents thiazole and pyrimidin on the growth of Rhodotorula rubra, R. flava, R. mucilaginosa, R. glutinis var. infirmo-miniata, R. aurantiaca, Dematium nigrum, Absidia ramosa, Parasitella simplex and Pilaira anomala was studied. Only 2-methyl-4-amino-5aminomethyl-pyrimidin, 2-methyl-4-amino-5-thioformylaminomethyl-pyrimidin and 2-5-dimethyl-4-aminopyrimidin act as growth factors in Rhodotorula rubra, R. flava and Dematium. Absidia ramosa and Parasitella simplex require the complete aneurin for normal development. Based upon these results and previous work a classification of the examined plants according to their requirements of aneurin or its components is suggested; it is assumed that the plants which need pyrimidin only represent a stage of evolution of heterotrophy the next step of which would be the ability to synthetize the complete vitamin (e.g., Absidia glauca).—Some observations on the specificity of 4-methyl-5- β -hydroxyethyl-N-[2-ethyl-4-aminopyrimidyl(5)-methyl]-thiazol were added after completion of the paper.—M.

6592. SIDERIS, C. P., and B. H. KRAUSS. Growth phenomena of pineapple fruits. Growth 2(2): 181-196. 1 fig.

1938.—The growth curve of pineapple fruits conforms closely to that of autocatalytic monomolecular reactions. The exptl. data were reduced to fit Robertson's equation (I)— $\log x/(a-x) = K(t-t_i)$ —and also a modified form of the same equation as recommended by Bray and Davis (II)— $\log (x+a)/(A-x) = \log a/A + Kt$.—The agreement between observed and calculated values of x was better, particularly at the earliest growth stages, when Equation II was employed. In Equation II the initial weight of the fruits (a) was taken into account when x was equal to zero time; in Equation I this item was left out. The percentage divergence between observed and calculated values has been attributed in part to a lack of absolute uniformity of the exptl. material and also to the inhibiting effects of slips on fruit growth. Data obtained for various sections of dissected fruits showed that the core reached full development before the shell. The flesh of the fruit was the last to reach complete growth and development. The interval between complete development of core and fruit ripening has been designated as "maturation period," because the tissues during this time attain maturity and accumulate, according to other unpublished data, sucrose, organic acids, carotenoid pigments, esters, etc.—Auth. summ.

6593. WHITE, PHILIP R. Potentially unlimited growth of excised plant callus in an artificial nutrient. Amer. Jour. Bot. 26(2): 59-64. 13 fig. 1939.—Excised callus obtained from proliferating procambial tissue of a hybrid Nicotiana (glauca × langsdorffii) has been maintained in culture in an environmental complex and nutrient similar to those earlier developed for cultivation of excised roots, through 40 passages of one week duration each. Cultures regularly increased about 3-fold in volume each week, giving a total theoretical increment of 3⁴⁶ = ca. 10⁴⁹. The conditions can, therefore, be considered adequate for unlimited growth of this material. These cultures show no evidence of differentiation or polarity except for an occasional scalariform cell. Being undifferentiated yet capable of unlimited growth, they appear to satisfy the two main requirements for a true "tissue culture."—P. R. White.

PHOTOPERIODISM

6594. DICKSON, HUGH. The effect on the growth of Sclerotinia fructigena of alternating periods of light and darkness of equal length. Ann. Botany 3(1): 131-136. 1 fig. 1939.—Apparatus is described which enables S. fructigena to be grown at a constant temp, and under equal alternating periods of light and darkness ranging from alternations of 0.3 sec. to 12 hrs. Diameters of the fungal colonies were detd, after 3 days' growth in the apparatus. Growth was slowest in total darkness, and faster in continuous light than in 12 hourly alternations. With the shortening of the period of alternation the growth increased. It reached a maximum at 1-minute alternations, decreased to a minimum at 5-sec. alternations and subsequently rose again. The effect of alternating light of different periodicities on the growth rate of the fungus is compared with its effect on chlorophyllous plants.—The effect of alternating light on plants cannot be interpreted solely by its influence on the photosynthetic mechanism; in addition there is an action on some photochemical mechanism present in non-green plants or there is some direct effect on the protoplasm.—

H. Dickson.

PHOTOSYNTHESIS

6595. MOMMAERTS, W. F. H. M. Some chemical properties of the plastidgranum. K. Akad. Wetenschap. Amsterdam Proc. Sect. Sci. 41(8): 896-903. 1938.—The chlorophyll in the living leaf is present as a prosthetic group of a protein (as with the hematin in hemoglobin). The name phyllochlorin is used for a combination of chlorophyll-protein in combination with carotenoids and lecithinoids; the latter 2 are thought to be loosely attached to the protein by cohesion forces. This phyllochlorin is present in the grana in a regular pattern (the grana, flat disk shaped bodies, occur in a regular pattern in the chloroplasts). The grana were separated from ground leaves of spinach, clover, etc., by centrifuging. In acetone or alcohol they lose their structure and form a precipitate of phyllochlorin in unorganized form. The protein-chlorophyll ratio was 100:55. This

would indicate that per protein unit of Svedberg (17,000) one chlorophyll molecule is carried (926). Autolysis of the protein occurs and is inhibited by traces of cupric ions. The grana also contain iron in organic state which may be the iron of catalase—I. van Overbeek.

the iron of catalase.—J. van Overbeek.

6596. NICOLAI, M. F. E., and C. WEURMAN. Some properties of chlorophyllmultifilms. K. Akad. Wetenschap. Amsterdam Proc. Sect. Sci. 41(8): 904-908. 1938.—According to views expressed at the Leyden Laboratory, the chlorophyll in the grana of the chloroplast is considered to occur in mono-layers. Chlorophyll layers are supposed to be alternated by a protein layer at the hydrophilous side of the chlorophyll and by a lecithin film at the hydrophobic side. By means of the technique of Langmuir and Blodgett the authors tried to prepare such films, using globin as protein. So far this system did not show the characteristic fluorescence of the chloroplast.—J. van Overbeek.

TRANSPIRATION, TRANSLOCATION, WATER RELATIONS

6597. GROSSENBACHER, KARL A. Autonomic cycle of rate of exudation of plants. Amer. Jour. Bot. 26(2): 107-109. 1 fig. 1939.—Helianthus annuus were grown in soln. culture in a greenhouse and under controlled conditions. Tests of exudation were made under constant conditions. The 24 hr. environmental cycle of a normal day or of light alone (during the growth of the plants) can fix the time when the maxima and minima of the 24 hr. exudation cycle occur. Under these conditions the exudation cycle is not materially affected by decapitation or slight temperature changes. Plants grown under constant conditions show 24 hr. autonomic cycles of exudation, but in this case the time of decapitation determines the time of occurrence of maxima and minima. A drastic rise in temp, during the exudation period will also determine the time of occurrence of maxima and minima. The 24 hr. periodicity of the exudation cycle is not materially affected by temp. and other treatments described.—K. A. Grossenbacher.

6598. RAMSAY, J. A., C. G. BUTLER, and J. H. SANG. The humidity gradient at the surface of a transpiring leaf. Jour. Exp. Biol. 15(2): 255-265. 7 fig. 1938.—An hygrometer and an evaporimeter, capable of investigating atmospheric conditions over small areas close to the surface of a leaf, are described. The determinations were carried out in a slow stream of air. In the case of rapidly transpiring leaves, e.g., Tulipa gasneriana and Rumex hydrolapathum, a humidity gradient was detected up to a height of 1.2 cm. In the case of less rapidly transpiring leaves, e.g., Prunus laurocerasus, increased humidity above the leaf surface was barely detectable.—J. A Ramsay.

RADIATION EFFECTS

6599. FÖCKLER, HANS. Über den Einfluss des Lichtes auf die Atmung farbloser und assimilierender Gewebe und seine Rolle beim "funktionellen Sonnenstich". Jahrb. Wiss. Bot. 87(1): 45-92. 1938.—Expts. with colorless tissues showed that in every case light accelerates respiration; this is noticeable at high light intensities; in no case was a retarding effect observed. The action of a time factor was observed which behaved differently in strong and weak light. There is an increase in the light effect from the long wave-length to the short wave-length components. "Light adapted" tissues show less acceleration of respiration when exposed to light. Difficulties were encountered in determining the direct influence of light on the respiration of green tissues. In many plants there is an acceleration of respiration observed for many hours after transferring the tissues to the dark. Long exposure in the dark also leads to a reduction in the assimilation capacity when subsequently exposed to light. In *Potamogeton lucens* a complete, irreversible alteration in the behavior of still living tissue was thus brought about. When assimilation was stopped by narcosis with 0.06% phenyl urethane subsequent exposure to light showed an immediate effect on respiration, the same relation between intensity and λ being shown as in the case of colorless tissues. In expts, with Trichomanes radicans and Laminaria the rôle of respiration in the "photic hindrance" of assimilation and in "sunstroke" is examined. This hindrance to photosynthesis is not explicable on the grounds of increased respiration. Rather there occurs, in these cases, a photic inactivation of the assimilation machinery quite unconnected with the accelerated respiration.—J. H. Priestley.

6600. MOEWUS, FRANZ. Carotinoide als Sexualstoffe von Algen. Jahrb. Wiss. Bot. 86(5): 753-783. 1938.—The cells of Chlamydomonas eugametos, non-ciliated in agar, are ciliated and motile in aqueous suspension in the light. In the dark, with oxygen, the cells are only ciliated and motile if given certain sugars; the most effective is gentiobiose, then follow, with decreasing effect, d-glucose, cellotriose, cellobiose, maltose, lactose, saccharose and raffinose. In the dark and without O2 the cells are motile, (a) in the filtrate from motile cell, (b) in crocin solns. The substances producing motility seem then to be crocin or a nearly related glycoside of crocetin. The effect of crocin is noticeable at a dilution of 1:250 billions! The "copulation substances," termed KQ and KQ, are only formed in blue or violet lights. The Q gametes can copulate after a shorter radiation period than the d. From the filtrate from a KQ culture, by radiation in blue or violet light a K_0^{-1} is obtained which on further radiation is transformed into a K_0 end stage. In red light a pre-substance V is formed. From a filtrate containing this, radiation with blue formed. From a filtrate containing this, radiation while due or violet gives first K°_{+} substance, then K°_{+} then the K°_{+} . The \circ filtrate K°_{+} consists of a mixture of 3 parts by volume of V with 1 part K°_{+} ; the σ of 1 part by vol. V with 3 parts V other mixtures 1:1, 2:1, 4:1, are without action. V may be substituted by cis. crocetin-dimethyl ester, the end substance (V by trans-crocetin-dimethyl ester, the end substance (V by trans-crocetin-dimethylester). ester; though it is not yet clear whether the natural substances are methyl esters or esters of other alcohols.—J. H. Priestley.

6601. YAMAFUJI, K., M. NISHIOEDA, und K. SO. Zur Bildung von Wasserstoffperoxyd im Organismus. Biochem. Zeitschr. 298(5/6): 293-297. 1938.—Yeast and sugar cane leaves were dried and extracted with 80% alc. Various fractions of this extract were prepared by treatment with such reagents on phosphotungstic acid. Pb acetate, AgNO3 etc. and the products suspended in water. The suspensions were irradiated with a mercury vapor lamp through plates of glass, quartz and paper for an hr. Only small amts. of H_2O_2 were formed. Similar results were obtained with solns. or suspensions of several common biological products such as glucose, casein, starch, glycerine and olive oil.—

C. S. Robinson.

RESPIRATION

6602. EIJK, M. van. Einfluss der Salzaufnahme auf die Wurzelatmung bei Aster tripolium. K. Akad. Wetenschap. Amsterdam Proc. Sect. Sci. 41(10): 1115-1121. 1938.

—It is well known that the accumulation of salts by roots takes place as a result of respiration. Lundegårdh has shown that also the reverse may occur, viz., salt uptake affecting respiration of roots. Further evidence for this is presented here. The uptake of NaCl by the halophyte A. tripolium increases respiration about 100% over roots present in tap water. Only during actual salt uptake is the respiration increased. Non-halophytes, oats, tobacco, have an even stronger "salt respiration" than the halophytes. It appeared that Aster liberates from .08 to .65 extra molecules of CO2 for each molecule of NaCl taken up. For the non-halophytes these figures were about 10

times larger.—J. van Overbeek.
6603. WARDLAW, C. W., and E. R. LEONARD. Studies in tropical fruits. IV. Methods in the investigation of respiration with special reference to the banana. Ann. Botany 3(1): 27-42. 6 fig. 1939.—Methods and apparatus are described, with special reference to the banana, for the measurement of respiration rate, internal gas concs., pneumatic pressure within fruits and tissue content of CO2. Methods whereby observations may be made on gradients of gaseous conc. and on temp. changes during ripening are

also described. In each instance, the advantages and limitations of the methods descr. are discussed, and their applicability to other fruits indicated.—C. W. Wardlaw.

METABOLISM, GENERAL

6604. POLSTER, HANS. Kohlehydrat/Stickstoff-Verhältnis und Blütenbildung. Beiträge Biol. Pflanzen 25(2): 228-260. 7 fig. 1938.—A test of Kleb's "Blütheorie" was undertaken by a detn. of C/N ratio in 3 phases of development of summer and winter wheat, namely, (1) during the yarovisation period, (2) during the vegetative stage, and, (3) at the time of transition from vegetative to reproductive stage with varovised and unvarovised material. At the time of flower formation there was an increase in the content of soluble N and carbohydrates which paralleled the decrease in insoluble N and starch. An increase in sugar conc. or a maximum C/N ratio does not exist in wheat in the stage of flower maturation. These determinations are in opposition to the theory of Klebs.—O. J. Eigsti.

CARBOHYDRATE METABOLISM

6605. FROMAGEOT, CL., et J. L. TCHANG. Sur la synthese des pigments carotenoides par Rhodotorula sanniei. Arch. Mikrobiol. 9(4): 434-448. 1938.—Glycerol is the most favorable energy source for the growth and pigmentation of R. sanniei. With glucose and other compounds there is good growth but inferior pigment production; colorless organisms may develop. For growth with glucose aneurin or its constituent pyrimidine are essential. With glycerol aneurin is apparently not essential.—H. 4. Racker. aneurin is apparently not essential.—H. A. Barker.

NITROGEN METABOLISM

6606. HAAS, PAUL, THOMAS GEORGE HILL, and BARBARA RUSSELL-WELLS. On certain simple peptides occurring in marine algae. Biochem. Jour. 32(12): 2129-2133. 1938.—The occurrence of peptides in the following marine algae is reported:—Pelvetia canaliculata forma libera (Phaeophyceae) and the encrusted red algae Corallina officinalis, Č. squamata, Amphiora capensis and Cheilosporium corymbosum, both the latter from S. Africa, Galaxaura subverticillata from Florida and Lithophyllum incrustans. The peptides are water soluble and readily diffusible, contain a small proportion of pentose sugar, and the yields of crude peptide vary in amount in the different algae from 0.05 to 0.728% calculated on dry weight of alga. The following amino acids were identified among the products of hydrolysis of the peptides:-alanine, arginine, aspartic acid, glutamic acid and phenylalanine. The peptides of the 2 spp. of Corallina examined differed in composition .- P. Haas.

6607. LUGG, JOSEPH WILLIAM HENRY. Preparation of some protein samples from the fresh leaves of plants and the sulphur distributions of the preparations. Biochem. Jour. 32(12): 2114-2122. 1938.—Methods of determining the S distributions were examined critically, and their deficiencies when applied to impure proteins are discussed. Estimations were made of the cystine (and/or cysteine) and methionine contents of impure proteins extracted from the leaves of Dactylis glomerata, Phalaris tuberosa, Medicago sativa and Atriplex nummularium. The cystine (and/ or cysteine) contents lay between 1.1 and 1.7%, and the methionine between 1.2 and 1.6% of the protein-N, M. sativa proteins giving lower values than the others.— J. W. H. Lugg.

6608. LUGG, JOSEPH WILLIAM HENRY. The amide, tyrosine and tryptophan contents and the sulphur distributions (cystine plus cysteine and methionine contents), of some plant leaf protein preparations. Biochem. Jour. 32 (12): 2123-2128. 1938.—Partial analyses have been made of protein preparations from the leaves of Dactylis glomerata, Phalaris tuberosa, Lolium perenne, L. italicum, Poa trivialis, Festuca rubra var. fallax (Hack) and Cynosurus cristatus, of the Graminae; Medicago sativa, Trifolium repens, T. pratense and Phaseolus vulgaris, of the Leguminosae; and Atriplex nummularium and Spinacia oleracea, of the Chenopodiaceae. In comparison with the Graminae preparations, those of the Leguminosae and Chenopodiaceae were generally of slightly higher tyrosine contents, those of the Leguminosae of rather lower cystine (and/or cysteine) and methionine contents, and those of the Chenopodiaceae of rather higher amide contents. The ranges over all the prepns. were: 4.7-5.98% amide-N, 2.09-2.74% tyrosine-N, 1.43-1.98% tryptophan-N, 0.99-1.70% cystine (plus cysteine)-N, and 1.01-1.69% methionine-N, the lower limits in the last 2 cases probably being underestimations, and the upper limits being possibly too high owing to lack of specificity in estimation in these same cases.—J. W. H. Lugg.

HARDINESS

6609. SIMINOVITCH, D., and G. W. SCARTH. A study of the mechanism of frost injury to plants. Canadian Jour. Res. Sect. C. Bot. Sci. 16(11): 467-481. 2 pl. 1938.—Observations in a micro-freezing apparatus of isolated tissues of the cortex of hardy and non-hardy plants of Catalpa and Cornus species, and of the epidermis of red cabbage, reveal that there are 2 modes of freezing of plant cells, intracellular and extracellular. In intracellular freezing, ice crystals form first in the protoplasm and then in the vacuole. In extracellular freezing, ice forms outside the cells from water in the cells. The resulting dehydration of the cell causes its collapse, the opposite walls coming together and squeezing the contents to the periphery. Intracellular freezing is fatal to all cells by visible mechanical disruption of the protoplasm and vacuole. It is facilitated by rapid freezing and occurs less easily and less frequently in hardy tissues and in trees and shrubs than in non-hardy and herbaceous tissues. Extracellular freezing induced through slow cooling is fatal to all unhardy cells in trees and herbs at all temps. below the freezing point, and to cells of hardy cabbage only at -10°C to -15°C, but not to cells of hardy trees and shrubs. Both types of ice formation have been observed in intact plants of red cabbage frozen in a refrigerator. The behavior of hardened plants shows that intracellular freezing tends to be prevented in them by an increased permeability to water. In regard to extracellular freezing, from the behavior of the cells on freezing and in micrurgy, a mechanical injury hypothesis is presented.—Auth. abst.

PIGMENTS

6610. FROMAGEOT, CL., et J. L. TCHANG. Sur les pigments carotenoïdes de Rhodotorula sanniei. Arch. Mikrobiol. 9(4): 424-433. 2 fig. 1938.—The red color of R. sanniei, grown on malt agar 10% sucrose, is due to 8 pigments, separable by partition between different solvents and by the chromatographic adsorption method. 7 of the pigments are neutral, one acidic. 4 of the neutral pigments are identified as β -carotin, γ -carotin, lycopin and torulin. Quantitative determination of the 3 most abundant pigments showed 10γ β -carotin, 143γ torulin and $29,000\gamma$ of

the acidic pigment per g. dry weight of cells.—H. A. Barker. 6611. KOZŁOWSKI, ANTONI. Photoxan, a yellow chromogen which is produced in certain plants in a correlation with authocyanin under influence of light and chlorophyll. [In Polish with Eng. summ.] Acta Soc. Bot. Polon. 15(1): 1-13. 1938.—Certain higher plants produce, under influence of sunlight, a yellow chromogen (photoxan), insoluble in benzene, chloroform, and benzine, but readily soluble in water, metanol and ethanol. It can be precipitated from aqueous soln. by basic Pb acetate. It is very labile and is readily oxidized to a red pigment in an acid soln. under influence of Br₂, H₂O₂, K₂Or₂O₇ and KMnO₄; that reaction is catalyzed by traces of Fe, inhibited by Cu. Photoxan shows some properties of a weak acid; it occurs in plants mostly in the form of a glycoside. Large amts. were found in the leaves of lettuce, spinach, and kale, in the seeds of pea and lupine, and in the skin of apple

vars. that produce anthocyanin.—F A. Gilbert.
6612. REICHEL, LUDWIG, und WALTER BURKART.
Über biogenetische Beziehungen der Anthocyanidine zu Flavonfarbstoffen und Catechinen. Chemie und Biochemie der Pflanzenfarbstoffe. Justus Liebigs Ann. Chem. 536(2): 164-173. 1938.—Autumn leaves of wild grapes were tested for catechins. Besides anthocyanidin a reddish brown phlobaphene product was found, whose color, solubility and heat of combustion agreed with those of the catechin.—

M. Neuhof.

ENZYMES

6613. DALTON, H. R., and J. M. NELSON. Crystalline copper-protein possessing tyrosinase activity. Jour. Amer. Chem. Soc. 60: 3085. 1938.—A crystalline Cu containing naterial has been obtained from the aqueous extract from Lactarius piperatus, which may be phenol oxidase or closely elated to it.—H. N. Glassman.

TROPISM, MOVEMENTS

6614. DENNY, F. E. Leaf-epinasty tests with chemical apors. Contr. Boyce Thompson Inst. 10(2): 191-195. 1939.

-Of 77 volatile chemicals not previously tested for ability to induce epinasty of potato leaves, only 3 gave positive responses: ethyl bromide, ethyl iodide, and propyl chloride. The epinasty-inducing volatile product from various organs of plants cannot be any of the 3 above-named alkyl halides, nor acetonitrile (previously reported to induce epinasty) since mixtures of these with air, when passed through a tube immersed in a freezing mixture of CO₂-snow and alcohol, gave negative tests for epinasty, while the volatile products from plants were not condensed by the freezing mixture and the uncondensed gas which issues from the tube retained its effectiveness. Tests of the other volatile chemicals which have been shown to cause epinasty—ethylene, propylene, acetylene, butylene, and CO—showed that the only one which behaves like the effective volatile constituent from plant tissue in being absorbed by the mercuric nitrate reagent and released again without loss of epinasty-inducing power was ethylene. Evidently the effective constituent from plant tissue is ethylene and not any of the other epinasty-inducing volatile chemicals tested in these expts.—Auth. summ.

in these expts.—Auth. summ.

6615. O'CONNOR, M. W. A study of phototropism in the sunflower. Ohio State Univ. Abst. of Doctor's Dissert.,

25. 305-310. 1 fig. 1938.—Discusses the effects of different wave lengths and intensities of light, the respective rôles of the leaves and growing tips, the possible rôle of auxins, and the effects of different soil water constituents.—F. V. Rand (courtesy of Exp. Sta. Rec.).

TOXICITY

6616. SETTERSTROM, CARL, and P. W. ZIMMERMAN. Factors influencing susceptibility of plants to sulphur dioxide injury. I. Contr. Boyce Thompson Inst. 10(2): 155-181. 1 fig. 1939.—The influence of a number of environmental factors on susceptibility of certain plants to SO₂ injury is reviewed, and considerable new exptl. data on susceptibility of alfalfa and buckwheat are added to those phases of the problem which are treated less extensively in the literature. The new data have been obtained from 29 factorial expts. designed to study a number of variables simultaneously and have been subjected to statistical analysis by the method of the analysis of variance. The influence of any environmental factor is based on observations of all the plants in each expt. All the plants, furthermore, are utilized in ascertaining whether the effect of any environmental factor depends upon the absence or presence of other factors, i.e., whether there exists any interaction between the factors. This method had been found to be a great improvement over the older methods of evaluating this type of data in which the tendency has been to direct attention to some particular case which happens to illustrate the case at hand. The expts. as designed have the further advantage that the effect of each factor rests on a broad basis of varied conditions rather than on some arbitrary standard running through the expts. The following statements summarizing the effects of the specific environ-mental factors, while based largely on the results of the factorial experiments, are founded in part on data previously reported in the literature: A plant is much more resistant to SO₂ at temps. of 40° F and below than at higher temps., yet there is no considerable variation in susceptibility above 40°, at least not within the range of 65° 105° F. In general, resistance to SO2 decreases with increase in relative humidity though differences of at least 20% appear necessary to cause detectable differences in susceptibility in the range above 40%. No data are available on the effect on susceptibility of growing plants in various humidities prior to SO₂ treatment. Minor variations in soil moisture, at time of exposure to SO2, the soil moisture being adequate for growth, are without effect on susceptibility, but when plants approach the wilting point there is a marked increase in resistance. Plants grown with an ample supply of water are much more susceptible to injury than are plants grown with an inadequate supply of water, even if the soil moisture content is the same in both cases at time of fumigation. Plants grown in a poor soil are more susceptible to injury than are plants grown in a good soil. Sulphate S content of nutrient supply has no effect on susceptibility. Pretreatment with SO2 has no effect on susceptibility provided sufficient time is allowed

for recovery between treatments. Plants grown under heavy shade (65% reduction in light intensity) are more susceptible to injury than are plants grown without shading. Reduction of light intensity up to 35% has no effect on susceptibility. Young plants are much more resistant to injury than are older plants. Middle-aged leaves are the most susceptible. Wetting of leaf surfaces has little or no

effect on susceptibility.—Auth. abstract.

6617. SETTERSTROM, CARL. Sulphur dioxide content of air at Boyce Thompson Institute. II. Contr. Boyce Thompson Inst. 10(2): 183-187. 1939.—For the year Nov. 1, 1037 to Nov. 1, 1038 1937 to Nov. 1, 1938, the average conc. including zero readings was 0.035 p.p.m. Maximum conc. recorded was 0.53 p.p.m. SO₂ was present in cones. of 0.01 p.p.m. and above, 60.6% of the time.—C. Setterstrom.

APPARATUS, METHODS

6618. CAMPBELL, WILLIAM GEORGE, JOHN CARS-WELL McGOWAN, and STEPHEN ARNOLD BRYANT. The chlorine-sodium sulphite colour reaction of woody tissues. II. The bearing of the colour reaction on the constitution of hardwood lignin. Biochem. Jour. 32(12): 2138-2141. 1938.—Cl₂ and Na₂SO₃ were applied to a further range of compounds and gallic, trimethylgallic and syringic acids gave colorations closely resembling the true magenta given by hardwoods and hardwood lignin. The color reaction is therefore not specific for the pyrogallol nucleus itself since it is given by the above derivatives. So long as at least one OH group of a pyrogallol derivative is free the color reaction is given by certain oxidizing agents other than Cl₂ and weak alkalis other than Na₂SO₃. When all 3 OH groups are methylated chlorination must precede the addition of Na₂SO₃ before the magenta color develops. From an investigation of trimethylgallic acid it is concluded that Cl acts as a demethylating as well as an oxidizing agent. The substance giving the color reaction with Na₂SO₃ is a minor product of chlorination. A similar set of reactions is pre-sumed to take place when hardwood lignin is exposed to Cl2 and Na2SO3 and by analogy it is deduced that hardwood lignin contains a recurring unit of formula:-

CHEMICAL CONSTITUENTS

6619. ERBRING, H., und H. GEINITZ. Über Zellulose-Neutralsalzlösungen. Kolloid Zeitschr. 84(1): 25-42. 1938.— If cellulose is treated with dilute solns. of Ca(CNS)2 it swells; treated with higher concs. of Ca(CNS)2 and at higher temp., it breaks down, the decomposition becoming apparent by the appearance of a yellow color. A soln. of Ca(NO₃)₂ has no effect on cellulose unless a higher pressure is applied and a CaCl₂ soln. does not decompose it all.—M. Neuhof.

6620. MEEUSE, B. J. D. Some observations on special structures in the cell walls of plants. K. Akad. Wetenschap. Amsterdam Proc. Sect. Sci. 41(9): 965-975. 1938.—When stained with chlor-zinc-iodide in a great many cells striations of the cell wall perpendicular to the longitudinal axis of the cell become visible in the cell walls. These are regarded as small cracks in the brittle cellulose cell wall which consists of parallel crystalline cellulose micelles. Such cracks will appear upon shaking, bending or tapping of plant material and also as the result of preparing microscopic sections, pricking with a needle, etc.-J. van Overbeek.

MISCELLANEOUS

6621. KRAMER, PAUL J. The effect of drops of water on leaf temperatures. Amer. Jour. Bot. 26(1): 12-14. 1939.

-The effect of drops of water on leaf temps. was investigated by inserting thermocouples into leaves which were sprayed with water. 2 thermocouples were usually inserted into a leaf, and the surface above one was kept dry while the surface above the other thermocouple was wetted. The leaves were exposed to the sun or to a 500 watt mazda lamp and the temps. of the wet and dry portions detd. The temp. of the leaf areas covered with water drops was 4-12° C lower than that of the dry areas, the average reduction being 8.5° C. Wetted leaves placed a few inches from a mazda lamp remained uninjured; dry leaves similarly exposed were killed by the heat. Drops of water probably cannot cause injury by acting as lenses and concentrating the sun's rays on the leaf tissue because the focal length of such drops is usually much greater than the thickness of the leaves. Injury to leaves from exposure to the sun while covered with water drops is much less common than popularly supposed, and possibly never

occurs.—P. J. Kramer.
6622. ROACH, W. A. Plant injection as a physiological method. Ann. Botany 3(1): 155-226. 1 pl., 34 fig. 1939.—
The history of plant injection from the 12th century is reviewed. By the methods described small interveinal areas of leaves may be injected with dyes, mineral salts, etc. so that the areas are sharply separated by secondary veins from the uninjected. By removing the apical quarter and immersing the cut edge a leaf may be injected while still attached. Injection through a petiole results in the perme-ation of leaves and parts of leaves above and below the injection point, the "injection pattern" produced depending on the particular phyllotaxis and the vascular anatomy of the stem; in some leaves so injected the mid-rib sharply divides the permeated from the unpermeated half of the lamina. Injection through a shoot-tip results in the perme-ation of a number of the terminal leaves. Branches may be injected independently of the rest of the tree through a suitably placed hole passing diametrically through the branch. The individual branches of certain trees may be injected (if required each with a different liquid) so that the corresponding roots are also permeated. Whole trees may be injected through a single diametrical hole, large ones through 2 or more radial holes. The methods may be used for various physiological purposes and especially for the diagnosis of mineral deficiencies; in some circumstances a diagnosis may be achieved in 4 days.—V. H. Blackman.

6623. SMIRNOV, A. I., i A. P. SHCHERBAKOV. Novyi metod izuchenifa vnutrikletochnogo obmena veshchestv v metod izuchenia vnutrikletochnogo obmena veshchesty v rasteniakh. [A new method for studying intercellular exchange of substances in plants.] [In Russ.] Khimizeliia Sotsialisticheskogo Zemledeliia (Chemisation Socialistic Agric.) 1938(6): 72-79. 1938.

6624. SPENCER, H. J. The effect of puncturing individual latex tubes of Euphorbia wulfenii. Ann. Botany 3(1): 227-229. 1939.—The results of puncturing living latex tubes are recorded. They suggest that rapid closure of the wound occurs allowing a recovery of turger in the tube.

wound occurs, allowing a recovery of turgor in the tube.-H. J. Spencer.

6625. SPENCER, H. J. On the nature of the blocking of the laticiferous system at the leaf-base of Hevea brasiliensis. Ann. Botany 3(1): 231-235. 1 fig. 1939.—A method is described for the anatomical examination of laticiferous systems. The arrangement of the latex tubes in H. brasiliensis is recorded, and the occlusion of the system at the mature leaf-bases of this plant is shown to be due to the deposition of plugs of callose in the tubes.-H. J. Spencer.

6626. SPENCER, H. J. Latex outflow and water uptake in the leaf of Ficus elastica. Ann. Botany 3(1): 237-241. 1 fig. 1939.—Potometer expts. with F. elastica leaves show that latex outflow causes an increase in water uptake rate, indicating an increase in suction pressure of the cells. The increase is progressively smaller at subsequent bleedings.-H. J. Spencer.

PHYTOPATHOLOGY

FREEMAN WEISS, Editor

(See also in this issue Entries 5316, 5327, 6046, 6161, 6293, 6308, 6337, 6477, 6481, 6515, 6561, 6564, 6568, 6572, 6594. 6616, 6617, 6621)

DISEASES CAUSED BY FUNGI

6627. CARRANTE, V. Il mal secco dei limoni e i mezzi di lotta piu consigliabili allo stato attuale delle cono-[Dry rot of lemon and means of control, most advisable, based on present information.] Boll. R. Staz. Sperim. Frutti. e Agrumicoltura Acireale 70. 1-32. 28 fig. 1938.—An account of the severity of the disease, its symptoms, the characteristics of Deuterophoma tracheiphila, its causal agent, and the means for control especially by

budding and employing resistant vars.—F. A. Wolf.
6628. d'OLIVEIRA, BRANQUINHO. Studies on Puccinia
anomala Rost. I. Physiologic races on cultivated barleys.
Ann. Appl. Biol. 26(1): 56-82. 1939.—A new arrangement
of the differential hosts for P. anomala is proposed with
a selection of Hey's, Mains' and Gassner's barleys. A key is provided for the identification of 30 physiol. races of this rust, 11 of which already described and 19 new; some of these were isolated from English, Portuguese and Spanish material, others were obtained by segregation and hybridization through the aecidial stage on Ornithogalum umbellatum. One mutant is recorded both in color and in pathogenicity. Evidence is given that under field conditions in Cambridge (England) this rust may overwinter in its uredosporic stage, while in Portugal (near Lisbon) the uredospores survive during the summer in the mountains.—B. d'Oliveira.

6629. DOIDGE, E. M. A common disease of dahlias. "S.A.G." (Cape Town) 29(2): 131-132. 1938.—Kromnek or

6630 KLOTZ, L. J., and H. S. FAWCETT. Isolation of Phytophthora spp. Phytopath. 29(3): 290-291. 1939.—P. citrophthora and P. parasitica were readily separated from contaminating organisms on specimens of Citrus by the following procedure. The infected pieces of bark, twigs, etc. were thoroughly washed, placed on hardware cloth at the top of a glass container and set in running water for 5-7 days, enabling the hyphae to grow and form sporangia. The set-up was removed from the running water, freshly picked lemons in the tree-ripe or silver stages placed on or near the specimens, and the swarm spores induced to form by replacing the tap water with water at 15° C. The lemons thus readily infected by the zoöspores were allowed to decay fully and the desired *Phytophthora* spp. recovered by removing the seeds aseptically and placing on a nutrient agar.—L. J. Klotz.

6631. MACDONALD, J. A. Coniophora puteana (Schum.)

Karst. on living Sequoia gigantea. Ann. Appl. Biol. 26(1): 83-86. 1 pl. 1939.—Pure cultures of C. puteana were isolated from rotted areas observed in the wood of a Sequoia trunk, on felling. The fungus was identified by its cultural characters. It is regarded as a primary parasite.—J. A. Mac-

donald.

6632. MURRILL, WILLIAM A. The cause of pecky cypress. Bull. Torrey Bot. Club 66(2): 87-92. 6 fig. 1939.— A brief account of the discovery of a fruit-body of what appeared to be Fomes geotropus on a decayed trunk of bald cypress, with a discussion of the rot.—W. A. Murrill.

6633. ROLDAN, E. F., and A. F. QUERIJERO. Black spot of peanut. Philippine Agric. 27(8): 669-682. 6 fig. 1939.—The black spot disease is the most prevalent and the destructive disease of peanuts in the Philippines. The causal organism, Cercospora personata, is not culturable on artificial media, and is not seed-borne but lives in the soil in the form of stromata in peanut refuse. Infection in the field is due to spores carried by the wind from the soil or from leaves of diseased plants.—M. Manresa.

6634. WILCOX, MARGUERITE S. Phomopsis twig blight of blueberry. Phytopath. 29(2): 136-142. 2 fig. 1939.

A minor Phomopsis twig blight of the blueberry, Vaccinium corymbosum, occurs sparingly in the commercial blueberry growing sections of Massachusetts, New Jersey and N. Carolina. This paper demonstrates the pathogenicity of this *Phomopsis* and its apparent identity with

P. vaccinii from decayed cranberry fruits. Young succulent blueberry shoots were blighted by both strains of the fungus regardless of the methods used for inoculation. Localized lesions were formed on woody tissue and occasional leaf spotting occurred.—M. S. Wilcox.

6635. WOLF, F. A. Downy mildew of tobacco in Brazil. Phytopath. 29(3): 291, 1939.—Record of occurrence of Peronospora tabacina in Rio Grande do Sul. Brazil.-

F. A. Wolf.

6636. YU, T. F. A blossom blight of broad bean (Vicia faba L.) caused by Botrytis cinerea Pers. under glass. Lingnan Sci. Jour. 17: 551-566. 3 pl. 1938.—B. cinerea causes blossom blight of the broad bean in the greenhouse (the disease in the field is mostly caused by B. fabae). The disease seldom occurs in well ventilated greenhouses. A high relative humidity (94%) is essential for its development. The max., opt. and min. temps. for the growth of the fungus on potato dextrose agar are about 30-32°, 20-25°, and 4°C resp. Spore germination occurs over a wide range of temps, the favorable range being 13.7° to 29.5° C. The opt. temp. for spore production is 21-23° C. Czapeck's agar is the best medium both for conidium- and sclerotium production. The morphology, physiology and pathogenicity of the causal organism are discussed. One spray of bordeaux mixture (4-4-50), applied at the time of the unfolding of the flower buds, was an effective means of control.—J. A.

DISEASES CAUSED BY BACTERIA

6637. BURKHOLDER, WALTER H. The taxonomy and nomenclature of the phytopathogenic bacteria. Phytopath. 29(2): 128-136. 1939.—This is an explanation of the treatment of the bacterial plant pathogens in the 5th edition of Bergey's Manual of Determinative Bacteriology. It is considered that the generic characters of flagella possession and position used alone by various taxonomists in their classification of bacteria do not divide the phytopathogenic forms into natural groups. However, with the use of physiological characters together with a limited number of morphological characters certain generic groups can be pointed out. No new generic names have been given as yet. The genus Erwinia is allowed to stand but is placed next the genera Escherichia and Aerobacter. Phytomonas next the genera Escherichia and Aerobacter. Phytomonas is divided into 3 natural groups. P. campestris (Pammel) Bergey et al, is the center of one group and P. syringae (Van Hall) Bergey et al, is typical of a 2d group. The latter is related to the genus Pseudomonas of Bergey. Phytomonas tumefaciens (Erw. Smith and Townsend) Bergey et al. and similar gall formers are related to Bacterium radiobacter and the genus Rhizobium. The wilt producers, as Phytomonas michiganensis (Erw. Smith) Bergey et al. show some relationships to the gall formers. The non-motile plant pathogens are not closely related and are divided among the above groups.—W. H. Burkholder.

6638. CALLAN, EDWARD McC. Cryptorrhynchus lapathi L. in relation to the watermark disease of the cricket-bat willow. Ann. Appl. Biol. 26(1): 135-137. 1939.—9 weevils were used in 3 types of expt. in 1936. Some were fed on diseased shoots, the proboscides of others were smeared with bacterial exudate from watermarked shoots or with a culture of Bacterium salicis. They were transferred to branches of 2 healthy bat willows (Salix caerulea) and to a number of healthy pot plants, on which they fed. No signs of disease were observed in the plants and trees during 1937 and 1938. The expt. was repeated in 1937 with 46 weevils, the majority being fed on diseased shoots of watermarked trees for a number of days and then transferred to healthy pot plants and to branches of 4 healthy trees; no disease appeared in 1938. Although occasionally attacking the bat willow, the weevil has not yet been associated with the watermark disease in the field and the above expts. have given negative results as to the

possibility of its being a carrier of the watermark disease.— W. J. Dowson.

6639. ELLIOTT, CHARLOTTE, and ALICE L. ROBERT. Tripsacum dactyloides, another native host of Aplanobacter stewarti. Phytopath. 29(3): 284-285. 1939.—Bacterial wilt lesions due to A. stewarti developed under natural conditions on T. dactyloides growing at Arlington Farm, Va. The plants were grown from seed collected at Bellsville, Texas in 1936. The somatic cells contained 36 chromosomes,

a characteristic of the Texas form.—C. Elliott. 6640. HILDEBRAND, E. M. Studies on fire-blight ooze. Phytopath. 29(2): 142-156. 4 fig. 1939.—Studies on fire blight ooze indicate that the bacteria can survive for 2 years or longer in the dried natural matrix but for only 2 weeks in the moist exudate. Ooze produced by inoculating green pear fruits under aseptic conditions was turbid at first but cleared with age, the clearing being correlated with rapid death supposedly due to some deleterious substance active when in the moist state. Prompt and rapid drying was found necessary for the bacteria to survive for longer than 2 weeks in their natural matrix. The color of the ooze was cinnamon rufous brown (Ridgway). Chemical analyses show that a sugar identified as dextrose comprises 31% of the dry substance in ooze, which taste alone did not reveal. The effect of prompt and rapid drying of the coze upon extrusion on the longevity of the pathogen was demonstrated experimentally. Only the ooze collected at the shortest interval of 7 days after inoculation survived for longer than 2 weeks. Similar effects on longevity were noted when the pathogen, which had been grown on agar, was subjected to the action of the sterile exudate matrix. The bacteria in ooze were more sensitive to heat and to bactericides than when grown on culture media. Diluted sterile matrix when added to synthetic medium served as a carbon source for the bacteria. The bacteria when embedded in their natural matrix stain unevenly with the dye taking effect chiefly at the poles. They seem to be surrounded by a sheath which can be removed by centrifuging. Diluted ooze with an osmotic pressure of 1.61 atmospheres produced wilting of pear shoots and cell plasmolysis; with pure sucrose solns. osmotic pressures of 15 atmospheres or over were required to produce these effects. Succulent pear shoots wilted when immersed either in ooze or in sterile ooze matrix from which the bacteria had been removed, indicating the presence of a toxin, the exact nature of which remains to be determined.—E. M. Hildebrand.

DISEASES CAUSED BY ANIMAL PARASITES

6641. GEMMELL, ALAN R. The infection of potato roots by Heterodera schachtii. Phytopath. 29(3): 287-288. 1939.—Larvae are easily detected in potato roots stained in 2% iodine in alcohol, and then destained in alcohol until the roots are clear. By using this method on root tips of the same length, and hence of approx. the same age, it was found that the resultant yield of the crop is directly related to the % of root tips infected in the early stages of the growth of the plant, all other factors being equal.—A. R. Gemmell.

6642. GOODEY, T. Observations on the destruction of the stem eelworm, Anguillulina dipsaci, by the fungus Arthrobotrys oligospora Fres. Jour. Helminthol. 16(3): 159-164. 4 fig. 1938.—In addition to destroying nematodes in soil rich in decomposing organic matter. A. oligospora was observed to be present in the decaying leaf tissue of living plants, Calceolaria integrifolia and Saxifraga cotyledon, where it attacked and destroyed large numbers of A. dipsaci.—O. W. Olsen.

6643. LI, L. Y., and T. C. LEI. Notes on Heterodera marioni as root parasites in some Kwangtung economic plants and weeds. *Lingnan Sci. Jour.* 17(4): 533-537. 1938.

VIRUS DISEASES

6644. BAWDEN, F. C., and F. M. L. SHEFFIELD. The intracellular inclusions of some plant virus diseases. Ann. Appl. Biol. 26(1): 102-115. 2 pl. 1939.—The contents of healthy cells and those infected with several plant viruses are described. Some of these viruses apparently do not produce intracellular inclusions; others produce amorphous bodies only, and the remainder produce both amorphous

and crystalline inclusions. The properties of the inclusions are compared with those of purified prepns. of the viruses. Insoluble complexes of the viruses with protamines, histones and proteins which in many ways resemble the intracellular inclusions can be produced in vitro. Possible explanations for the formation and disappearance of the inclusions in infected plants are suggested.—F. C. Banden.

inclusions in infected plants are suggested.—F. C. Bawden. 6645. CALINISAN, MELANIO R. Transmission experiment of abacá mosaic. Philippine Jour. Agric. 9(3): 309-313. 3 pl. 1938.—The aphid Pentalonia nigronervosa, lace bugs, Stephanitis sp., and an unidentified leafhopper are vectors of abacá mosaic.—M. Manresa.

6646. CARTER, WALTER. Geographical distribution of yellow spot of pineapples. Phytopath. 29(3): 285-287. 1 fig. 1939.—Typical yellow spot of pineapples was found in the Bathurst area of S. Africa. Symptoms in the fruit were most commonly encountered, suggesting that the vector in that area is primarily a fruit feeder and may be Frankliniella schultzei. Observation in the Philippine Islands did not confirm Serrano's findings. No yellow spot was found on Mindanao, either in pineapples or in Emilia, although the latter plant was generally distributed.—W. Carter.

6647. COCKERHAM, G. The distribution and significance of certain potato viruses in Scotland. Scotlish Jour. Agric. 22(1): 1-11. Map. 1939.—Under the scheme of certification maintained by the Dept. of Agric. for Scotland almost 60,000 acres of potatoes are inspected annually for health and varietal purity. Analysis of reports on stocks inspected in 1937 revealed these facts: "wildings" are varietal abnormalities the distribution of which is unaffected by environment; leaf-roll is a significant disease in the South Eastern counties of Scotland; there are differences in varietal susceptibility to leaf-roll; virus Y is of major importance in the South Western counties only; severe mosaic (virus complex A+X) is widely distributed but is confined mainly to a small group of vars, which are almost invariably "carriers" of virus A; and virus X is present and spreads readily in all districts. The ubiquity of virus X and its significance with regard to differential grading of certified stocks is discussed in detail. Vars. which upon artificial infection with virus X react with a lethal necrosis are shown to be virtually immune from infection with this virus under field conditions. Replacement of non-necrotic reactor vars. by necrotic reactors offers a practical method of control over virus X. Lethal necrotic reaction has been shown to be inherited in regular fashion as a dominant character and hence the introduction of new necrotic vars. should not offer unsurmountable difficulties to the breeder.—Auth.

6648. DECOUX, L., et M. SIMON. L'influence de la jaunisse et de la pourriture du coeur sur la composition de la Betterave sucriere. Publ. Inst. Belge Améliorat. Betterave 6(4): 265-270. 1938.—Sugar beet roots affected with virus yellows have a higher N content than healthy roots. Yellow areas of affected leaves are lower in N than green areas. Heart rot causes accumulation of nitrogenous compounds in the root.—W. W. Robbins.

6649. DENNIS, R. W. G. Notes on the photoperiodic re-

6649. DENNIS, R. W. G. Notes on the photoperiodic reactions and virus contents of some Peruvian potatoes. Ann. Appl. Biol. 26(1): 87-101. 2 pl. 1939.—59 Peruvian Potato vars. obtained from Puño were grown at Cambridge under 9-hour day and full summer day conditions. The latter favored blooming and tended to eliminate the dormancy period of the tubers. In some vars. no tubers formed under long day conditions. Only 11 vars. proved free from viruses. The remainder contained viruses resembling X, B, C, F, G and perhaps leaf roll, (Solanum viruses 1, 4, 5, 8, 9, and 14 respectively). There was also evidence of the presence of other viruses not hitherto observed in Europe.—R. W. G. Dennis.

6650. DENNIS, R. W. G. Studies on Solanum virus 4. Phytopath. 29(2): 168-176. 1 fig. 1939.—Solanum virus 4 was freed from contamination with Solanum virus 1 by passage through the Potato 41956. Physical properties of the purified virus are almost identical with those of Solanum virus 1, from which the virus may be distinguished by its reaction on Datura, tomato and certain potato vars. Infection with either Solanum virus 1 or Solanum virus 4 does not protect a plant against reinfection with the other virus.—R. W. G. Denvis

6651. KAUSCHE, G. A., und H. STUBBE. Über Aktivierungseffekte mit Röntgenstrahlen am Tabakmosaikvirus. Naturwiss. 26(45): 740-741. 1938.

6652. KAUSCHE, G. A. Über Aktivierungseffekte mit Gamma-strahlen am Tabakmosaikvirus. *Naturwiss*. 26(45): 741. 1938.

6653. KAUSCHE, G. A. Über den färberischen Nachweis des Tabakmosaikvirus. Naturwiss. 26(45): 741-742. Illus. 1938.

6654. KIENHOLZ, J. R. Stony pit, a transmissible disease of pears. Phytopath. 29(3): 260-267. 2 fig. 1939.— Stony pit is described as a virosis of pear trees. Symptoms consist of a fruit pitting, a so-called oak-bark effect, and probably of a veinlet chlorosis of certain leaves. The disease is known to be present on the Bosc var. and occasionally on the Anjou in California, Oregon, and Washington. It was transmitted to healthy Bosc and Anjou trees from diseased Bosc buds; in most cases the symptoms appeared during the 2d season. The Bartlett var. was found to be either tolerant or immune by the same method.—
J. R. Kienholz.

6655. MILBRATH, J. A. Tomato tip-blight virus. Phytopath. 29(2): 156-168. 4 fig. 1939.—A virus is described, which causes a black necrotic spotting of the leaves of tomato plants, followed by a pronounced blighting of the terminal shoots. Since the outstanding symptom is the blighting of the terminal tips, the virus is named "tip blight virus." The virus is similar to the spotted wilt virus, but it is even more easily inactivated. The thermal death point lies between 40° and 41.5° C, the longevity in vitro is less than an hour, and the dilution end point is less than 1 to 50. The virus is difficult to transfer nechanically. It is transmitted by Thrips tabaci. The symptoms produced on several differential host plants are described, and methods of identifying this virus are discussed. The spotted wilt virus sometimes occurs in the same plant with the tip blight virus, in which case the spotted wilt virus can be separated from it.—J. A. Milbrath.

6656. PINCKARD, J. A., and LUBEN BOZOVAISKY. The effect of flue-curing on the infectivity of ordinary tobacco mosaic virus (tobacco virus 1). Phytopath. 29(3): 242-250. 1939.—Flue-cured tobaccos have been shown to be carriers of infectious tobacco virus 1. The virus remained infective in flue-cured leaves throughout 4 of the first 5 barns cured and in the lower and middle tiers of the 5th barn. Although it was completely inactivated in the lower tiers of 7 barns of cured tobacco in 1937, the final drying temps, at this position were substantially higher than those ordinarily required for curing. In other portions of the same barns, maximum temps, were both above and below the thermal limit of the virus. Wide temp, differences, amounting to as much as 50° F, were found within the same wood-fired barn. A study of the maximum temps, attained in 5 barns of tobacco cured with an oil-burning heating unit showed that at no time was the thermal death point of the virus reached. Leaves infected with tobacco virus 1 lost weight, cured, and became dry at the same temp. and time as did noninfected leaves. The temps required for a satisfactory "cure" varied, but were substantially below the thermal death temp. and time for complete inactivation.-J. A. Pinckard.

6657. ROLAND, G. Recherches effectuees en 1937 sur la Jaunisse et quelques Carences minerales de la Betterave. Publ. Inst. Belge Améliorat. Betterave 6(2): 79-99. 1938.— A single insect vector, Myzus persicae, is sufficient to infect a sugar beet with beet yellows. After 3 days on a healthy beet, the aphis carrying the virus still has the ability to transmit the disease. Macrosiphum solanifolii is also a vector of beet yellows. The disease is not transmitted by contact of roots, nor is it possible to artificially transmit it by the juice. The disease is not transmitted from the aphis to its progeny. Beet yellows and potato leaf roll appear to be caused by two different agents. Spinach is a host for beet yellows. Typical symptoms of beet yellows appear only when the plant has sufficient water, and has received a complete fertilizer.—W. W. Robbins.

6658. THORNBERRY, H. H., and H. H. McKINNEY. Purification of Nicotiana virus 6 protein. *Phytopath.* 29(3): 250-260. 1 fig. 1939.—An infectious protein was precipitated

in crystalline or paracrystalline form from the infectious juice of plants showing symptoms of Nicotiana virus 6 (dark-green mosaic of tobacco) by adjusting the reaction to pH 4.5 and adding (NH₄)₂SO₄ to 0.3 saturation. Infectivity of the preparations was measured by the number of local-necrotic lesions that developed on N. sylvestris inoculated with the virus. Trypsin added to purified virus protein was without noticeable effect upon infectivity, but it caused slight hydrolysis of protein. Protein in juice from healthy plants precipitated in amorphous form and was digested by trypsin much faster than the protein material from diseased plants. Normal proteins are apparently associated with the crystalline virus protein, this normal protein being the digestible portion of the virus protein material. Partial elemental analysis of the virus protein gave 13.28% N, no P, 0.16% S for the dialized material and 11.9% N, 0.33% P, and 1.33% S for the non-dialized. Development of crystals as observed by dark-field and direct illumination was dependent upon the reaction of the medium. At pH 7.5 no particles were visible; at pH 7 a few small refractive particles were present. Increasing acidity caused the size and number of crystals to increase to the maximal size and number at pH 4.5. Stream-double refraction indicated that non-spherical particles were present at pH 7.5. The action of trypsin on the virus protein at pH 7.5 precipitated the protein in typical crystals without any change in reaction. Crystals of this virus protein and of Nicotiana virus 1 (common tobacco-mosaic virus protein) are illustrated by drawings.—H. H. Thornberry.

6559. TOMPKINS, C. M. A mosaic disease of radish in California. Jour. Agric. Res. 58(2): 119-130. 5 fig. 1939.—The disease occurs in the San Francisco Bay section. The symptoms consist at first of irregular-shaped, chlorotic lesions which later develop into a coarse mottle. On older, infected plants, the normal, dark-green tissue appears as irregularly shaped, nonraised islands on a yellowish-green, chlorotic background. The radish mosaic virus is readily transmissible by mechanical inoculation, with or without carborundum. The incubation period ranges from 9 to 18 days. Unsuccessful attempts were made in the greenhouse to transmit the radish mosaic virus by means of the cabbage, green peach, or turnip aphids. The virus retained its infectivity after aging for 14 days at 22° C. It is inactivated by heating for 10 min. at 68°, but causes infection when diluted up to 1 to 14,000. The host range of the radish mosaic virus includes 19 spp. of plants representing 9 genera in 4 families. In the family Cruciferae, infection was obtained on pe-tsai, kale, Brussels sprouts, cabbage, sprouting broccoli, cauliflower, kohlrabi, black and white mustard, evening scented stock, Virginian stock, turnip, Chinese mustard, and Chinese radish, in addition to several cruciferous weeds. Annual stock plants were found to be resistant. Other susceptible hosts included lambsquarters, sowbane, spinach, rocket larkspur, Nicotiana glutinosa, N. langsdorffi, N. rustica var. humulis, and Turkish and White Burley tobacco (N. tabacum).—C. M. Tompkins.

NON-PARASITIC DISEASES

6660. CARRANTE, V. La "Fetola" delle arance e dei mandarini. [The "fetola" disease of orange and mandarin.] Boll. R. Staz. Sperim. Frutti e Agrumicoltura Acireale 71. 1-7. 1938.—A new disease of oranges and mandarines involving the oil glands is illustrated and described. It appears to be caused by environmental or climatic factors.—F. A. Wolf.

6661. CLARK, J. H. Red stele, a new disease of the strawberry. New Jersey State Hort. Soc. News 19(6):

6662. KLOTZ, L. J. Water damage to a Citrus relative, Fortunella margarita. Phytopath. 29(2): 214-215. 1 fig. 1939.—The first evidences of injury are microscopic cracks which enlarge to deep cracks extending from stylar to calyx end. The injury was reproduced in a rain chamber. Sap expressed from the rind and whole fruit of kumquat and from Washington Navel orange had more sugars and higher osmotic values in the former than in the latter. The rind sap of kumquat also had more pectin than that of Washington Navel orange.—L. J. Klotz.

Washington Navel orange.—L. J. Klotz.

6663. MANNINI, P. Sopra un caso di fasciazione in un ramo di gelso. Ann. R. Staz. Bacol. Sper. Padova 49: 521-

532. 2 fig. 1937(1938).—The author describes a case of fasciation of a mulberry tree of the Florio var. The tree had been heavily manured during the winter; the fasciation was produced in the spring; morphological examination of the branch showed that all layers (pith, wood of the 1st, and of the 2d rings, etc.) are elliptical in section.—M.

Tirelli (tr. by A. P. Hitchens).

6664. REED, H. S. The relation of copper and zinc salts to leaf structure. Amer. Jour. Bot. 26(1): 29-33. 3 fig. 1939.—Leaves of Cu-deficient tomato plants were involuted and characteristically blue-green, eventually containing necrotic spots. The palisade cells sometimes separated, thereby leaving substomal cavities beneath the dorsal epidermis. Subsequently the separated palisade cells shrunk and ultimately disappeared as a result of the lysis of their contents. If necrosis appeared, it started in these schizogenous cavities. The plastids of affected leaves were ultimately disorganized. The leaves of Zn-deficient tomato plants showed characteristic dwarfing, curvature of leaflets, chlorosis, and involuted laminae, soon followed by necrosis. Palisade cells were longer and plastids smaller in affected leaflets. The scarcity of plastids, production of melanotic material, and calcium oxalate crystals in the spongy parenchyma were indications of disruptive metabolism in affected leaflets.-H. S. Reed.

PARASITISM AND RESISTANCE

6665. BARRONS, KEITH C. Studies of the nature of root knot resistance. Jour. Agric. Res. 58(4): 263-271. 1 pl. 1939.—Microscopic studies revealed that larvae enter rootlets of susceptible and resistant plants to the same degree. On the most resistant plants galls never develop beyond slight swellings immediately behind the root tip. Resistance is probably due to a substance synthesized within the plant that counteracts the giant-cell inducing effect of the salivary secretions of nematode larvae.—K. C. Barrons.

6666. BROWN, NELLIE A. Colchicine in the prevention, inhibition, and death of plant tumors. Phytopath. 29(3): 221-231. 2 fig. 1939.—Different methods of using colchicine were tried in attempting to prevent the inception of plant tumors, to inhibit growth that had begun, and to kill tumors already formed. Tumor formation was prevented in only a few cases. It is possible that a different technique would have been accompanied by greater success. Brushing the surfaces of bacterial tumors was an effective method for inhibiting further growth and, in time, killing the tumor. Each tumor was brushed only once. Of 305 tumors so treated, 239 died; other parts of the plant remained healthy and continued to live and function normally throughout the life span of the plant. Of the 49 tomato tumors included in this number, none succumbed to the treatment. Brushing the surfaces of indoleacetic acid tumors with 2% colchicine soln. inhibited further growth but did not kill the tumors. Stronger solns., which may be effective in killing indoleacetic acid tumors, have not been tested.—Auth. summ.
6667. DIACHUN, STEPHEN. The effect of some soil

factors on Penicillium injury of corn seedlings. Phytopath. 29(3): 231-241. 1939.—When wounded corn kernels were inoculated by immersion in a spore suspension of Penicillium oxalicum and then planted with the wound pressed into contact with very wet soil, the injury caused by the fungus was not as severe as when wounded inoculated kernels were planted in loose wet or dry soil. P. notatum, and P. spp. isolated from a corn ear in the field, offered wounded kernels partial protection against infection by P. oxalicum from the soil. Antagonism between these species and P. oxalicum was not observed in culture. A substance toxic to corn seedlings was produced by P. oxalicum on Richard's solution, on autoclaved kernels, and living kernels. -S. Diachun

6668. GARRETT, S. D. Soil conditions and the take-all disease of wheat. IV. Factors limiting infection by ascospores of Ophiobolus graminis. Ann. Appl. Biol. 26(1): 47-55. 1 pl. 1939.—Ascospores failed to infect wheat seedlings growing in a variety of natural, unsterilized soils. Such ascospores germinated freely on nutrient agars, and infection could always be produced by means of the resulting agar cultures. Successful ascospore infection was eventually obtained by inoculating wheat seedlings growing in bacteriologically sterile soil or sand. Failure to secure infection in

unsterilized sand is attributed to competitive assimilation by other micro-organisms of organic excretions from the seed-

ling roots.—S. D. Garrett.
6669. HILL, L. M. A study of suberin and suberized deposits of diseased potato tubers. *Phytopath.* 29(3): 274-282. 4 fig. 1939.—Microchem. and optical properties of suberin and suberized deposit in necrotic lesions of potato tubers affected with several diseases were studied in comparison with necrosis associated with the blue-stem disease. The petrographical microscope was useful in confirming the microchemical tests. Optical properties distinguishing cutin, suberin, suberized deposits and cellulose were found useful in determining the nature of the substances found associated with necrosis in the potato tubers. The suberized deposit is isotropic, suberin is anisotropic. Cutin was not present in necrotic lesions of the diseases studied.—L. M. Hill. 6670. LEACH, J. G., PHARES DECKER, and HANNAH

BECKER. Pathogenic races of Actinomyces scabies in relation to scab resistance. Phytopath. 29(2): 205-208. 4 fig. 1939.—The occurrence of 2 pathogenic races of A. scabies is reported. The susceptibility of potato seedlings, previously reported as resistant, is explained on the basis of different pathogenic races of the pathogen. The significance of the recognition of pathogenic races in the problem of breeding for resistance and in the study of nature of resistance is

discussed.—J. G. Leach.

6671. LeCLERG, E. L. Studies on a cultural variant of Rhizoctonia solani. Phytopath. 29(3): 267-274. 3 fig. 1939. This is a sector variant which occurred in a sugar-beet isolate of R. solani. The hyphae of the 2 cultures did not differ significantly in diam. The parent culture grew faster on potato dextrose, dextrose, and methylene-blue media, but much slower on media of high-, medium-, and low-N composition. The parent grew faster than the variant on media containing 0, 1, and 5% sucrose, slower on media with 10 and 20% sucrose. The radial growth of parent was greater than that of the variant at 15°, 23-25°, and 29-30°C. The parent culture was more aggressive in causing root rot of large sugar-beet roots; the variant caused more damping off of sugar beets at 15° and 25°C.—E. L. LeClerg. 6672. PRATT, R. Respiration of wheat infected with

powdery mildew. Science 88(2272): 62-63. 1 fig. 1938.—Infection of wheat leaves by Erysiphe graminis tritici markedly increased the rate of O₂ consumption.—Courtesy of Exp.

Sta. Rec.

6673. SCHLEIP, H. Untersuchungen über die Auswuchsfestigkeit bei Weizen. [Investigations on scab resistance in wheat.] Landw. Jahrb. 86(5): 795-822. Illus. 1938.

6674. SHANDS, R. G. Chevron, a barley variety resistant to stem rust and other diseases. *Phytopath*, 29(2): 209-211. 1939.—Chevron, C.I. 1111, is a var. of *Hordeum vulgare* pallidum with spring growth habit. The original seed lot was obtained in 1914 from Switzerland and from this source Chevron was selected at Chico, California, in 1918. Chevron was resistant to stem rust which occurred as a natural epidemic in 1937. It had previously shown resistance in a light epidemic in 1935. Crosses and backcrosses involving Chevron indicated that its rust resistance was governed by a single factor. This barley was found to have a fairly stiff straw and to have resistance to scab caused by Gibberella saubinetii. Other workers have shown it to be resistant to powdery mildew (Erysiphe graminis hordei), and stripe (Helminthosporium gramineum), but it has proved susceptible to leaf rust and the sporidium-forming smuts of

barley.—R. G. Shands.
6675. THOMAS, R. C. Transmissible lysins in water extracts of seeds. Science 88(2272): 56-57. 1938.—Using Aplanobacter (=Phytomonas) stewarti as test organism, very strong transmissible lytic factors (bacteriophages) were found in aqueous extracts of living seeds of rye, oats, winter wheat, and of foxtail, redtop, and timothy grasses. Basing the conclusion on 7 points of comparison (noted), it is believed almost certain that the lysins of seed extracts are identical with the lytic factor found in fire blight canker.-

Courtesy of Exp. Sta. Rec.

DISEASE CONTROL

6676. BRATLEY, C. O., and A. S. MASON. Control of black rot of pineapples in transit. U. S. Dept. Agric. Circ. 511. 1-12. 1 fig. 1939.—In 14 holding expts. in Puerto Rico

and in 7 shipping expts. between Puerto Rico and New York City, benzoic acid in alcoholic soln. was the most effective of several materials tried for the control of black rot (*Thielaviopsis paradoxa*) in Red Spanish var. of pineapples. Although effective over a wide range of concs. a soln. made up of $2\frac{1}{2}$ g. of benzoic acid in 100 cc. of 30% alcohol gave excellent control when applied with a small brush to the cut surface of the stem within 2 hours after the fruit was harvested. About $\frac{1}{5}$ of the decay was found to start at packing bruises on the side of the fruit. Proper sizing of fruit prevented much of this bruising. Correct weight and size of fruits for the different packs are presented .- Authors.

6677. BURKHOLDER, C. L., and R. C. BAINES. Apple scab leaf counts, 1937. Trans. Indiana Hort. Soc. 1937: 133-135. 1937.—Counts are given for different spray preparations and schedules. The value of leaf counts is noted in view of the fact that severe outbreaks of scab are more likely to occur after heavy foliage infection the preceding year.—Courtesy Exp. Sta. Rec.
6678. GERHARDT, FISK, and A. LLOYD RYALL. The

storage of sweet cherries as influenced by carbon dioxide and volatile fungicides. U. S. Dept. Agric. Tech. Bull. 631. 1-20. 1939.—Sweet cherries were stored for various intervals of time, at different temps, and atmospheric cones, of CO2. The fungicidal value of certain volatile chemicals is discussed. Bing and Lambert vars. can be held in CO2 without impairment of flavor as follows: At 60° F for 12 days in 40%; at 45° for 10 days in 75%; at 45° for 20 days in 40%; at 45° for 17 days in 25%; at 32° for 31 days in 10%. Fungus decay of sweet cherries was controlled during 17-20 days' storage at 45° in 25% of CO₂. At 45° this gas can safely be used over a rather wide range of concs. (25-40%). Addition of 25% of CO_2 to the storage air at 45° produced a greater inhibition of decay in sweet cherries than did a 30% drop in temp. In firmness, brightness, freshness, and freedom from decay, gas storage at 45° (25%) is preferable to air-storage at 32°. The possibility of using CO₂ during freight shipment of sweet cherries is discussed. Sodium bisulphite, methyl bromide, iodol, thymol iodide, and di-chloramine T either injure the fruit or are of questionable fungicidal merit. Elemental I is an effective fungicide only in concs. sufficient to produce lenticel burning and surface discoloration of sweet cherries .- F. Gerhardt

6679. McCOWN, M. Fruit russet. Trans. Indiana Hort. Soc. 1937: 132, 133. 1937.—Field notes on apple varietal incidence, and on the relation to copper and sulfur sprays.—

Courtesy Exp. Sta. Rec.

6680. MILBRATH, J. A., and F. P. McWHORTER. Pre-liminary recommendations for the control of the root and crown disease of cypress. Oregon Agric. Exp. Sta. Circ. Inform. 187. 1-2. 1938.—The disease of Chamaecyparis lawsoniana and vars. is shown to be due to Phytophthora

sp. All spp. and vars. should be considered susceptible.—
F. V. Rand (courtesy Exp. Sta. Rec.).
6681. MILLS, W. D. The control of apple scab without serious injury to foliage. Connecticut Pomol. Soc. Proc. Ann. Meet. 47: 85-95. 3 fig. 1937.—Trees in one orchard arm. Meet. 47: 80-95. 3 ng. 1937.—Trees in one orenard receiving the lime-sulfur treatment over a 5-yr. period showed an increased yield due to larger bearing surface and better pollination. This increase was about 3.25 bu. per tree per yr. with the full lime-sulfur schedule, about 5 bu. with 2 wettable sulfurs, flotation sulfur and dry-mix, substituted for the summer sprays, and 7.25 bu. with the flotation sulfur for all sprays. Scab control was good with all these materials. In another test including flotation sulfur and Kolofog the differences in yield were not significant, but the latter failed to give as good scab control. In spite of its greater tendency to spray injury and to reduction in yield, the superior effectiveness of lime-sulfur against scab makes its use imperative in certain situations. Liquid limesulfur applied only a few minutes before a rain gives protection, and good results are often obtained by spraying immediately after a rain. Wettable sulfurs do not possess these good qualities. The best type of schedule varies with the orchard, equipment, grower, and season.—Courtesy Exp. Sta. Rec.

6682. PINCKARD, J. A., F. A. WOLF, RUTH McLEAN, F. R. DARKIS, and P. M. GROSS. Laboratory studies on toxicity of benzol vapors to tobacco seedlings and to

Peronospora tabacina. Phytopath. 29(2): 177-187. 3 fig. 1939.—Attempts have been made by laboratory methods to determine the minimal concas. of benzol vapor in air that are injurious to tobacco seedlings and the concns. toxic to P. tabacina. Apparatus has been designed for use in treatment with benzol. A combustion method of analysis has been devised that is adapted for detn. of benzol in benzol-air mixtures. Among the several factors that appear to be involved in determining limits of toxicity are duration exposure to treatment, number of applications, and presence of visible moisture on the foliage. At atmospheric pressure, concns. of benzol vapor in air greater than 2% by volume was injurious to tobacco seedlings if the foliage was wet during the period of medication, and those greater than 3%, caused injury, if there was no visible moisture on the leaves. Concns. of benzol vapor in air of 0.5% by volume or greater were lethal to sporangia of the tobacco-downy-mildew fungus. Repeated exposure of infected seedlings to less than 0.5% by volume of benzol inhibited sporulation. Lower concns. of benzol vapor were required to cause injury at pressures less than atmospheric pressures. It is suggested that the mechanism of toxic action by benzol involves first absorption by the cell walls and then the dissolution of lipoidal materials in the plasma membrane, with consequent impairment of permeability and correlated functions.—J. A. Pinckard.
6683. PINCKARD, J. A., and RUTH McLEAN. Paradi-

chlorbenzol, an eradicant fungicide, effective against downy mildew of tobacco. Phytopath. 29(2): 216-219. 3 fig. 1939. Tobacco seedlings, naturally infected with downy mildew (Peronospora tabacina), were fumigated with vapors of paradichlorbenzol for 12-hour periods at night. Seed beds 4 sq. yd. in area, covered with cotton sheeting having a warp and woof of 64 threads per inch and a weight of 1 lb. per 2.68 sq. yd., were used. Nightly applications of 28 g. of paradichlorbenzol placed above the plants on net evaporators, 18 in. sq., were fungistatic. Eradicant fungicidal vapor concns. were obtained with single applications of 112 g. of the fumigant. By increasing the area of the net evaporators to equal that of the seed beds (4 sq. yd.), 225 g, of paradichlorbenzol was fungicidal although phytocidal concns. were approached. Using water-proof seed bed covers and 4 sq. yd. net evaporators, phytocidal concns. were obtained with 453 g. of the fumigant. Maximum temps, of fumigation were less than 75°F.—J. A. Pinckard.

6684. SMEDLEY, ENID M. Experiments to determine the relative toxicity of ammonium chloro-acetate and related chemicals to the potato eelworm (Heterodera schachtii). Jour. Helminthol. 16(3): 177-180. 1938.—Expts. were performed to determine the toxic effects of the various chloro-acetates on the potato eelworm in soil from Yorkshire, a fine silt which "pans" when wet, and that from Ayrshire, which is almost pure sand, showed that ammonium chloro-acetate should give complete control of the eelworm when used at the strength of 15 cwt. per acre in eelworm when used at the strength of 15 cwt. per acre in Yorkshire soil and 10 cwt. per acre in Ayrshire soil. The majority of the cysts are killed by application of 10 and 5 cwt. per acre, respectively.—O. W. Olsen.

6685. SUIT, R. F., and J. G. HORSFALL. A simple method of measuring the interfacial friction of dusted seeds. Phytopath. 29(2): 200-204. 1939.—A plunger is thrust

into a beaker full of seeds sitting on a spring platform scales. The interfacial friction is measured in pounds by the indicator needle on the scales. Red copper oxide, 2% Ceresan, New Improved Ceresan, copper carbonate, Semesan, zinc oxide and talc increased the interfacial friction of seeds dusted with them. Flake graphite is more efficient in reducing interfacial friction of dusted seeds than amorphous graphite of equal particle size.—R. F. Suit. 6686. TRESCHOW, CECLL. Undersøgelser over Brint-

jonkoncentrationens Indflydelse paa Vaeksten af Svampen Polyporus annosus. [The influence of H-ion conc. on the growth of P. annosus.] [With Ger. summ.] Forst. Forsøgsvaesen Danmark 15(1): 17-32. 1 fig. 1938.—P. annosus was cultivated in a special culture jar on filter paper placed on glass floats in about 1 liter of 3% malt extract soln. It grew equally well at all pH values between 3 and 7. When cultivated directly in a liquid substrate (3% malt-extract soln.), a distinct growth optimum was observed at a pH 4-4.4. P. annosus would probably be able to adjust the pH

of a solid substrate (or of forest humus) in the direction required for its growth; therefore, addition of lime to acid forest soil would probably not be a practicable method of control. Culture exps. in sterile forest humus, to which varying quantities of lime were added with corresponding and change of pH, showed that addition of lime had no influence on the growth of P. annosus.—C. Treschow.

6687. YARWOOD, C. E. Powdery mildews of peach and rose. Phytopath. 29(3): 282-284. 1 fig. 1939.—Sphaerotheca

pannosa on peach and S. pannosa on rose are morphologically distinct in their conidial stages. They both overwinter in infected buds. Conidia from peach mildew made considerable growth on rose leaves, but no growth of rose mildew on peach leaves was observed. Peach mildew was more luxuriant on leaf curl-infected leaves of ornamental peaches than on noncurled leaves.—C. E. Yarwood.

6588. YARWOOD, C. E. Control of powdery mildews with a water spray. Phytopath. 29(3): 288-290. 1939.—
Euonymus japonica infected with Oidium euonymi-japonici, rose (var. Dorothy Perkins) infected with Sphaerotheca pannosa, bean (var. Pinto) infected with bean mildew (Erysiphe polygoni), cucumber infected with cucumber

mildew (E. cichoracearum), and barley infected with E. graminis were sprayed with water at about 70 lbs. pressure so as to get a washing effect for a few seconds in each treatment. In all cases infestation was greatly reduced and practical control of mildew obtained.

MISCELLANEOUS

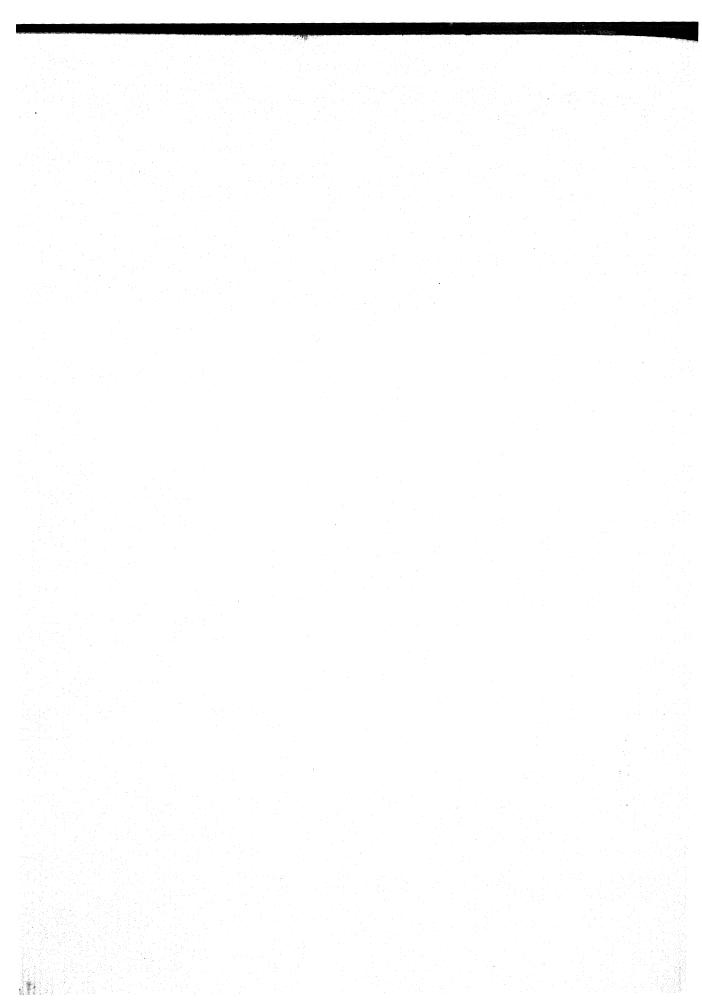
6689. BEELEY, F. Diseases and pests of new plantings

of Hevea. Planter (Kuala Lumpur) 19(9): 452-453. 1938. 6690. LAMBERT, EDMUND B. A spore isolator combining some of the advantages of the La Rue and Keitt methods. Phytopath. 29(2): 212-214. 1 fig. 1939.—An inexpensive device is described for isolating single spores from

the surface of agar plates.—E. B. Lambert.

6691. ANONYMOUS. Seed testing and plant registration.

Scottish Jour. Agric. 22(1): 38-54. 1939.—Annual Report of
Scottish Department of Agriculture's Station of above
name includes results of exps. on reduction of yield of potatoes, varying from 20 to 95%, caused by combinations of viruses. Results of exps. on factors influencing development and control of dry rot of tubers (Fusarium caeruleum) are given.—C. E. Foister.



ECOLOGY

Editors

W. C. ALLEE, General Animal Ecology G. D. FULLER, General Plant Ecology CHANCEY JUDAY, Hydrobiology (Oceanography, Limnology)

FREDERICK A. DAVIDSON, Ecology of Wildlife Management—Aquatic
W. L. McATEE, Ecology of Wildlife Management— Terrestrial

(See also in this issue Entries [GENERAL AND ANIMAL ECOLOGY]: Seashore invertebrates of Pacific N. America, 7072; Physiol. adaptation of man to high altitude, 7531; Aggregation in tadpoles, 7615; Human population growth, 8309; Frost as related to air movement, 8492; Ants of forests, Germany, 8521; Insects of felled poplar, 8653; Zoogeography of Naiades, 8743, 8744; Ecology of snails, 8745, 8747; Temp. as affecting wing movement in insects, 8762; Mammals of Mongolia, 8854; Adaptations in field mice, 8860; Lemmings eaten by owls, 8866. [PLANT ECOLOGY]: Phytogeography of lichenes, 8414; Vegetation of Macedonia and Thrace, 8444; Seed germination in fescues, 8467; Soil deterioration, western Canada, 8479; Soil colorimetry, 8488; Frost damage in citrus, 8517; Forest vegetation, Italy, 8533; Phytoclimatic zones, Italy, 8540; Ca content in plant, 8566)

GENERAL

7174. HANSON, HERBERT C. Ecology in agriculture. Ecology 20(2): 111-117. 1939.—Permanent agriculture must be in adjustment with the environment. The U.S. is passing from its pioneering stage into more advanced stages. In too many regions, however, pioneering or invasion will be repeated, but it is hoped that it will be based upon sounder knowledge of the environment. Stabilization of agriculture to the environment requires the services of scientists in many fields. The special contribution of ecology is to ferret out relationships with the environment so that man, using this knowledge in conjunction with that obtained from other fields, can strive intelligently to secure balance and stabilization, a goal essential for the attainment of the "abundant life" and the building of a culture far beyond our present dreams.—H. C. Hanson.

7175. SMITH, G. E. P. The physiography of Arizona

valleys and the occurrence of ground-water. Arizona Agric. Exp. Sta. Tech. Bull. 77. 41-91. 3 pl., 26 fig. 1938.—This bulletin describes the physiography of Arizona valleys, including the natural surface features and the character and origin of the underlying valley fill; indicates the location, storage characteristics, and availability of the ground-water supplies in general; and shows the relationship of the physiography to the important supplies. "Although the topography of the bottom lands, the slopes, and the foothills appears to be accidental and haphazard, it is found on analysis to be definitely regular and understandable. Based on a knowledge of the origin and history of the natural surface features, a great deal can be foretold about the water storage capacity and the safe yield of the underlying formations." The importance, in relation to the Arizona ground-water law, of a distinction between "percolating" waters and waters "flowing in definite underground channels" is noted, and the basis for such a distinction is provided.-Courtesy Exp. Sta. Rec.

ANIMAL

7182. ADENSAMER, W. Stammesgeschichtliche und tiergeographische Erörterung über ostalpine Faunenelemente. Zool. Anz. 124(5/6): 111-129. 4 maps. 1938.—Whether high alpine forms have persisted in the east Alps through the glacial periods or have retreated into the Alps since the last glaciation from a general mid-European distribution is a still unanswered question. The distribution of certain boreo-alpine gastropods indicates that they are relicts of a fauna which had a much wider distribution before the last glaciation. The maps presented show that the northern and southern parts of the east Alps (Austria) have a much richer high alpine fauna (snails, beetles) than the central parts and that in fact the distribution of these animals corresponds to the regions of eternal snow during glacial times. The most acceptable explanation is that this fauna, which includes very old and primitive forms, had always lived in alpine heights during or even before the ice ages. An example is the snail Cylindrus obtusus, belonging to the very old subfamily Helicigonae of which preglacial alpine types are known from fossils, and which have changed but little. Probably this alpine relict fauna lived during glacial times chiefly on projecting ridges, ledges, pinnacles, etc., which became free from snow during summer. On the other hand, the distribution of the spp., vars., and races of

the lower alpine snails of the genera Helicigona and Orcula indicates that such forms occupied subalpine regions during glacial times and have penetrated into the central Alps since the last glaciation. These postglacially inwandered forms occupy areas not inhabited by the relict forms. Certain types such as helicid snails of the section Filicinella spreading northwestward from southeastern Europe met an invincible barrier in the high Alps especially during glaciation.

 $extit{-}L.\,H.\,Hyman.$

7183. ALLEE, W. C., and JANET WILDER. Group protection for Euplanaria dorotocephala from ultra-violet radiation. *Physiol. Zool.* 12(2): 110-135. 1 fig. 1939.—Other things being equal, these planarians survive lethal exposures to u.-v. irradiation better if irradiated in numbers rather than singly and if after irradiation together, half of the individuals are grouped while the other half are isolated. In all instances survival was tested in fresh, non-irradiated water into which the grouped and isolated worms were transferred alternately. The group effect was apparent when worms were placed (a) in equal volumes or (b) in volumes proportional to numbers providing surfaces were equal and depth unequal but not if surfaces were unequal and depth was equal. An artificial increase in CO₂, to simulate a probable condition in water about the grouped worms, delays cytolysis following irradiation. Agitation of the worms (and the containing water) hastens cytolysis in the grouped animals only which causes the usual differential survival of grouped and isolated worms to disappear. This indicates the importance of some volatile substance, probably CO₂, as an agent retarding cytolysis. As supporting evidence, when waters rich in carbonate are made slightly acid, contained planarians after irradiation live longer than in similar but slightly alkaline water. In carbonate-free well water, pH is apparently an effective factor; under these conditions survival is longer in the lower H-ion conc. Irradiation increases the permeability of these worms to contained electrolytes if they are assayed in hypotonic water. This effect is not found in water with a conductivity of 3.2×10^{-1} mhos or more. As little as 0.000001 M CaCl₂ in double distilled water delays cytolysis. Grouped planarians assayed, after irradiation, in distilled water, probably give off enough more Ca than do isolated animals to account for the observed group protection. This is probably not effective in water which is already fairly rich in Ca. With other factors controlled, length of survival is directly related to the total electrolytic concentration of the water; in distilled water planarians increase this conc. and do so more rapidly after irradiation. Loss of electrolytes into waters of higher conductivity has not been shown. The evidence at hand does not permit a precise delimitation of the rôles played by Ca, total electrolytic content, pH and CO₂ in producing the longer survival of grouped planarians.—W. C. Allee.
7184. HALL, R. P., and H. W. SCHOENBORN. Fluctua-

tions in growth-rate of Euglena anabaena, E. gracilis, and E. viridis, and their apparent relation to initial density of population. Physiol. Zool. 12(2): 201-208. 6 fig. 1939.— Fluctuations in growth rate of autotrophic strains of Euglena anabaena var. minor, E. gracilis and E. viridis were noted in successive transfers in inorganic media. These fluctuations appear to be dependent upon an inverse relationship between growth rate and the initial density of population. Comparable relationships were also observed

in paried series differing only in initial density of population. Under the conditions described, the initial density of populaton seems to be more important, in its influence on growth rate, than are environmental factors which in themselves are known to influence the rate of population growth.—R. P.

7185. HUNGATE, R. E. Experiments on the nutrition of Zootermopsis. III. The anaerobic carbohydrate dissimilation by the intestinal protozoa. Ecology 20(2): 230-245. 4 fig. 1939.—The hypothesis is advanced that the protozoa of Zootermopsis carry on an anaerobic fermentation process which gives rise to products absorbed and used by the termite. By mechanical separation of the protozoa and suspension in suitable media it is shown that they are anaerobic and accomplish a fermentation process which cannot be ascribed to bacteria. CO_2 , H_2 , and H Ac are identified as metabolic products. The amts. of these products recovered indicate that other more reduced materials are also formed. The amt. of cellulose digested in the termite is compared with the amount of fermentation products recovered; most of the cellulose utilized apparently undergoes the fermentation process by the protozoa. -R . E . Hungate .

7186. MATHIAS, P. Sur la résistance de Palaemon squilla et de Crangon vulgare a la diminution de salure de l'eau. Bull. Soc. Zool. France 63(6):: 337-343. 1938.— These species can be kept alive, at least for some days, in sea water diluted to at least 255 times its original volume. Specimens bearing a *Bopyrus* parasite died much sooner

than specimens not so parasitized.—R. Paulian.
7187. SWEET, HELEN E. A micropopulation study of Euglena gracilis Klebs in sterile, autotrophic media and in bacterial suspensions. Physiol. Zool. 12(2): 173-200. 5 fig. 1939.—Optimal, supraoptimal, and suboptimal volume relations of cultures of washed-sterile euglenae exist, which regulate growth or survival of a group accordingly. are optimal, suboptimal, and supraoptimal densities of bacteria associated with euglenae populations. Deterrence of division is common in the densities and with the species of bacteria tested. Some material or materials present in sterile or nonsterile wheat infusions is more conducive to growth of populations of euglenae, and also affords more protection against toxic effects of ultra-violet irradiation, than does the artificial salt soln. tested. Smaller inocula show significantly greater advantage in situations in which the deleterious elements of the environment are not too great. Larger inocula show significantly greater advantage when the defects of the environment are greatest. Jahn (1929) found, from the study of mass cultures, no evidence of the Robertson effect; his least-dense cultures, however, correspond fairly well to the optimal numbers constituting an inoculum for the present small volume cultures, whose division rates were found to be greater than either those in more dense or more dilute cultures. The Robertson effect, or certain aspects of it, is present in some of the optimal volumes and may be operating in all of the supraoptimal volumes reported in this paper. To this extent the present studies yield evidence of Robertson's effect. There is, however, no clear evidence of the validity of his theory.—Auth. summ.

PLANT

7188. ALTEHAGE, C., und FR. JONAS. Die Vegetation und Entwicklung eines mitteldeutschen Trockenrasen-bodens bei Merseberg. Beih. Bot. Centralbl. Abt. B 55(3): 347-372. 5 fig. 1936.—This paper deals with the "Black soils" of central Germany. The area studied lies in the Leipzig-Halle region 5 km. N. W. of Merseberg. The geology, climate and vegetation of the area is discussed. 3 periods may be recognized in the pollen profiles: the 1st short period with *Pinus* dominant, decreasing *Corylus* and *Alnus*, and at the same time, low *Picea* and Ericales. The 2d period shows *Pinus* still leading but with a sharp increase in Picea and with it the disappearance of the thermophile elements of the preceding period. During the 2d period there were apparently 3 cooler phases separated by 2 warmer ones. In each of the 3 cooler phases only Pinus, Picea and Betula occurred. The 2 warm phases are older than preboreal and belong in the early post-glacial. The last period is the postglacial period of the reappearance of the thermophile spp.

Corylus, Alnus and Quercus. In the uppermost samples the better known spectra of the Boreal and Early Atlantic occur. The real *Pinus* maximum of the Boreal is absent. The time of formation of the "Black Soils" was in the Bühl stage with the following Late Glacial. The beginning of soil formation at Knapendorf falls about 32,250 B. C. The forest period of the 3 forest phases then comprises an interval of around 20,000 years (50,000 to 30,000 B. C.). A comparison of the Knapendorf profiles with those of the Kowel type shows a close agreement from which conclusions are drawn as to the climatic changes during the geological periods in which these profiles were formed.-H. F. Bergman.

7189. BUKEY, F. S., and J. E. WEAVER. Effects of frequent clipping on the underground food reserves of certain prairie grasses. *Ecology* 20(2): 246-252. 1939.—Plots of little bluestem (*Andropogon scoparius*) and big bluestem (A. furcatus) were clipped frequently during 1933-34-35 at Lincoln, Nebraska. Underground parts of control and clipped plants were analyzed chemically several times during 1934-35. There was a marked decrease in the percentage of invert sugar, water-soluble hydrolyzable material and water-insoluble hydrolyzable material under conditions of severe clipping. Drought during 1934 and 1935 had a similar but smaller effect on the stored nutrients of the control plants for comparable periods. N was almost constant, varying between 42% and .78% under all condi-

tions of the expt.-J. E. Weaver.

7191. COOPER, WILLIAM S. A fourth expedition to Glacier Bay, Alaska. *Ecology* 20(2): 130-155. 13 fig. 1939.— A fourth expedition to This complex fiord, 60 miles long, is bounded by flat forelands and low mountains along its lower portion, followed by an open expanse of 15 mi. surrounded by abrupt mountain slopes. Glaciers descend from the mts. and in 1935 some 9 of these reached tide-water. Some centuries ago the ice fields were more contracted than at present. This contraction was followed by an increase that reached its max. 200 yrs. ago. Since that time there has been a rapid retreat. Vancouver's record has made possible the detn. of the location of the ice front in 1794. Permanent quadrats established in 1916 show 3 successional stages of vegetation: (1) A pioneer community of Rhacomitrium canescens, Epilobium latifolium, Equisetum variegatum, Dryus drum-mondii and prostrate willows; (2) A Salix-Alnus sinuata thicket; and (3) A climax forest of Picea sitchensis, Tsuga heterophylla and T. mertensiana. Records of the quadrats indicating this succession are shown in charts and tables. Similar stages exist on the foreland and these are descr. in detail. Evidence is presented that interglacial forests, reaching climax stage, existed during the period of contracted ice fields preceding the late glacial maximum. These forests extended northward in the Muir Inlet at least as far as the ice has now receded. Proof of the existence and extent of these forests is seen in the stumps and other forest relics that are being uncovered. The ancient and modern forests appear to be essentially identical in character.—G. D. Fuller.

7192. EMBERGER, L. Aperçu general sur la végétation du Maroc. Veröfientl. Geobot. Forschungsinst. Rübel 14: 40-157. Map, 11 pl., 5 fig. 1939.—The Mediterranean climate is characterized by the coincidence of the cold and wet seasons, the summers being dry. Among Mediterranean climates the Moroccan represents a rather oceanic type, the temp. amplitudes being generally small. The types of climate of Morocco are classified: Saharian, arid, semiarid, sub-humid, humid and alpine Mediterranean climate.— Saharian: Typical deserts do not exist in Morocco, even the driest places receive small amts. of precipitation each year during the winter. Even outside the river valleys there is a permanent, but very scanty, vegetation, partly dominated by Acacias (A. raddiana, A. seyal and A. gummifera) on sandy soil, partly by smaller bushes or dwarfbushes like Anabasis aretioides on rocky soil. Real desert sand dunes do not occur in Morocco, the small ones occurring are colonized by Aristida pungens, etc. Characteristic sp. of oases: Phoenix dactylifera, Arid region: Climate very dry, represented on the S and E shores of the Mediterranean, it is seldom found in Europe but occupies great areas in Morocco. The warmer types are characterized by open forests, the colder by

types by Stipa tenacissima steppes. Vegetation types: 1: Argania spinosa forest, in primitive state rather dense and with abundant undergrowth; grows on all types of soil except loose sand. Approaching the dryer regions, the forest becomes lower and Argania gives way to Euphorbia echinus et al.; along the shores the occurrence of Pistacia and Olea indicates a semi-arid climate. 2: Zizyphus lotus and Acacia gummifera form extensive scrubs, generally much degraded by pasturage. Great areas are transformed to secondary Stipa tortilis steppes. Soils often show a conc. of soluble salts in upper layers. 3: The Stipa tenacissima steppes on well-drained soil and the Artemisia herba alba communities on heavier soils represent the colder types of crid veretation. arid vegetation, in regions where winter temps, are lower. They also occur in places where the dryer forest types have been destroyed.—The semi-arid region occupies immense areas in the Mediterranean countries; in Morocco it is found both on the Atlantic and Mediterranean sides, encircling the central mountain massifs. The main difference between this climate and the preceding, greater humidity, is conditioned partly by higher precipitation, partly by lower evaporation. According to the geographical position, the temp. of the coldest month is above or below 0°, thus presenting a series of sub-types. The coldest types are characterized by the occurrence of Juniperus thurifera, the intermediate by J. phoenicea, the warmest by a number of plant communities that distribute themselves according to the properties of the soil. 1: Callitris articulata forest. Generally rather indifferent with regard to nature of soil, but near limits of distribution restricted to selectors with but near limits of distribution restricted to calcareous soils, being crowded out from other types by competitors. In primeval state the *Callitris* forest is a rather open forest with high-grown trees with a remarkable number of characteristic spp. 2: Juniperus phoenicea forest. Quite in-different with regard to the nature of the soil; it substitutes Callitris whenever the climate becomes more continental. However, it does also occur along the coasts, but only on unstabilised sand that cannot be invaded by other spp. J. phoenicea occupies an intermediate altitudinal position between Quercus ilex (above) and Callitris (below), it does not occur in the most oceanic parts, and does not form a pure belt except in the driest, where Callitris does not grow. Most of the J. phoenicea forests are destroyed. The littoral J. phoenicea forests are floristically quite different from the regular type. 3: Juniperus thurifera var. africana forests. These replace the J. phoenicea forests in the most continental parts of the semi-arid region, where winter temps. are rather low, chiefly confined to the Grand Atlas Massif. But in other massifs this sp. occurs also in moister situations, forming the timber-line. The low temps are here conditioned by the altitude. J. thurifera is often the only remains of Cedrus forests, disappeared long ago, the Juniperus surviving as the most resistant sp. Many J. thurifera forests are really reduced cedar forests. Further forest destruction must be prevented as the J. thurifera forests are of very great economical importance. As the forests are very open, their undergrowth is most varied, even including cushion plants from the alpine regions. 4: The Olea-Pistacia-Chamaerops scrub occupies considerable areas, but is confined to heavy clayey soils. As soon as the soil changes, Callitris, Quercus suber or Q. ilex invades. As the community occupied those soils that were best suited for cultivation, it has been almost totally destroyed. The extreme state of degradation is the Chamaerops humilis community. In spring this scrub is characterized by a multitude of flowering plants, to a great extent geophytes, 5: Pinus halepensis forests are rather rare in Morocco, but the recent degradation seems to favor its spreading. The old, relict forests are surrounded by a zone with younger trees. In the dryer parts of Morocco, however, *Callitris* is favored, as conditions are a little too dry for *P. halepensis*. The strictly local old *P*. halepensis forests differ a great deal from each other and constitute 2 different floristic types, one Mediterranean and one Atlantic. 6: Cupressus sempervirens forest is represented in one place. Its floristic composition shows that it is a Juniperus phoenicea forest which has become dominated by Cupressus. 7: The following forest types are represented in the semi-arid region, but have their proper distribution outside it: Aragania forest, Quercus suber forest and Q.

ilex forest. The subhumid region is in Morocco restricted to the middle altitudes in the mountains, except in a few places with very great precipitation. 1: Quercus ilex forest. Q. ilex is distributed over great areas and has covered still greater. It is preferably a montane sp. The semi-arid types are low, with an under-growth which is very like that on the Q. suber forest. The primeval Q. ilex forest is composed of trees with straight stems, middle height, very dense and with little undergrowth. Most forests are, however, more open, due to logging operations and the under-growth therefore much richer. 2: Quercus coccifera community (scrub or, rarely, low forest) is restricted to a very limited area in Morocco. 3: Pinus pinaster forests really belong to the humid region, but are represented also in the sub-humid. The Olea-Pistacia-Chamaerops scrub is represented by a type without *P. atlantica* (but containing *P. lentiscus*). 5: Quercus suber forests are decidedly calcifuge. They are widely distributed in Morocco and represent very great economic values. During a previous, moister period, the tree had a much greater distribution than today, many isolated outposts must be considered relicts from this period. Some of these belong to the semi-arid region; the famous forest of Mamora also lies within this region, on sandy soil. While the semiarid types are rather open, the subhumid is much denser and the tree crowns form a continuous cover. Both types invade the Olea-Pistacia-Chamaerops scrub where the soil is not clayey. The humid region, in which the Mediterranean character of the climate is less pronounced, occupies smaller areas than the pre-ceding. In the lowlands this type of climate is rare, in the mountains a colder subtype is more distributed. 1: Cedrus atlantica forest occupies an area of 215,000 ha. at present, but very much has been destroyed. It occurs between 15-1600 and 2900 m.s.m., it never forms the timberline. It is curious that Cedrus does not occur, nor does it seem to have occurred in places, e.g., in Grand Atlas, where the climatic conditions seem to favor its occurrence. 2: Abies pinsapo ssp. maroccana occupies a small area, forming forests between 1500 and 2100 m. 3: Quercus tozza also occupies a very small area. 3: Quercus faginea forests do not occupy a very great area, but are widely distributed, indicating a former greater importance. It is a very well established community that cannot be invaded by other spp., but Q. faginea partly invades the surrounding forests. 5: Quercus suber, Q. ilex and Pinus pinaster also occur in small quantities in the humid region. The altitude of the timber-line varies between 28-2900 and 31-3200 m.s.m. It is generally composed by Juniperus thurifera, sometimes by Q. ilex. A sub-alpine scrub-belt is never found.—The alpine region is decidedly dry, the maximum of precipitation lying lower than the timber-line. The lower alpine region is characterized by the dominance of cushion-plants. Most remarkable stations are formed by soil that is permanently wet. The flora of such places bears a very strong resemblance to the European alpine flora. Chionophilous vegetation is to the European alpine nora. Chionophilous vegetation is formed by Ranunculus geraniifolius ssp. aurasiacus, Cossonia spp. etc. The highest zone is characterized by a very scattered herb vegetation. The flora is composed of 26 spp., 20 of which are endemic. The most important edaphic vegetation types are those of salt soil, Atriplex halimus, etc., scrub and Spartina stricta ssp. maritima communities, the latter occurring on the seashore. Intermittent lakes, dry in summer, are characterized by a vegetation of Juncus spp. and in the permanently water-covered parts, Phragmites, etc. With regard to all communities mentioned the paper gives an account of distribution and floristic composition. The distribution of Chamaerops humilis and Stipa tenacissima in Morocco is mapped.—K. Faegri.

7193. HANSEN, HENRY P. Pollen analysis of a bog near Spokane, Washington. Bull. Torrey Bot. Club 66(4): 215-220. 1 fig. 1939.—Pollen analysis of a post-Wisconsin bog in Northeastern Washington, in a Pinus ponderosa climax formation, indicates the following stages of postglacial forest succession: (1) An initial forest of Pinus contorta, P. monticola, and Larix occidentalis, with a preponderance of the first; (2) A period of increase in grasses; (3) A period of heavy influx of Composites and Chenopods; (4) Increase in Pinus ponderosa, P. contorta, and P. monticola, with dominance of the first; and (5) A final period of climax

forest dominated by Pinus ponderosa. In terms of climate this succession marks an initial period of coolness and medium dryness, followed by increasing warmth and aridity, which was succeeded by a period of increasing coolness and moisture reaching a maximum, which has remained more or less constant to the present.—H. P. Hansen.

7194. HEATH, O. V. S., and F. G. GREGORY. The constancy of the mean net assimilation rate and its ecological importance. Ann. Bot. 2(8): 811-818. 1938.—The data of net assimilation rate during the vegetative phase have been compared for a number of annual plants of different types grown at different latitudes under varying manurial conditions. The mean net assimilation rate is not very variable, and the seasonal variation for barley in 4 years (0.418-0.658 g./dm.2/week; mean 0.546) is nearly as great as that found among the different spp. examined grown in various locations (0.413-0.720; mean 0.552). The total CO₂ assimilated per unit area of leaf surface must therefore be nearly constant for the plants examined. Differences in dry matter production are mainly due to differences among plants in rate of production of leaves and size of leaf surface. The importance of establishing net assimilation rate in ecological investigations is stressed.— O. V. S. Heath.

7195. HEYWARD, FRANK. The relation of fire to stand composition of longleaf pine forests. Ecology 20(2): 287-304. 7 fig. 1939.—A detailed study was made of stand composition of 51 long-unburned forests of longleaf and slash pines as compared with nearby forests subjected to repeated forest fires. The areas studied were widely distributed over the longleaf pine region from S. Carolina to Louisiana. Hardwoods were numerous in practically all longleaf pine stands of pole size or larger from which fires had been excluded for more than 10 yrs. In dense young pine stands hardwoods were not numerous enough to present a problem. The study revealed a strong trend toward hardwood invasion in such stands, however, the hardwoods becoming increasingly abundant as the pines increased in height, since the increased space beneath the pine canopy gave more room in which the tolerant hardwoods might develop. On areas where no fires had hindered the growth of the hardwoods, they had developed into dominant and codominant trees in the pine stand and occupied a considerable percentage of the total crown space within the dominant stand. As a direct result of fire protection, therefore, a pure longleaf pine type may become a mixed pinehardwood forest. Furthermore, if no silvicultural measures are taken to retard the development of the hardwoods, pines will ultimately be completely excluded from the forest by hardwoods.—F. Heyward.

7196. JAESCHKE, J. Zur Waldgeschichte des Knüllgebirges. Forstwiss. Centralbl. 60(21): 676-683. 1 fig. 1938.

—Pollen analyses of peat from the Knüll Mt. in western Germany indicate that forest vegetation since the oakmixed forest period developed there in much the same way

as in other nearby districts.—W. N. Sparhawk.

7197. JUDD, B. IRA. Plant succession on scoria buttes of western North Dakota. *Ecology* 20(2): 335-336. 1939.—On the scoria buttes there has been initiated a unique type of plant succession. The soil is highly alkaline, and subject to active erosion accompanying the torrential rains. On the steep slopes most of the pioneer species are perennials with tap roots, such as Artemisia longifolia and Eriogonum multiceps. In addition to the pioneer stage, a 2d weed stage, a 1st grass stage, a climax stage and a post-climax stage are recognized. The last named stage is characterized by the growth of trees along the stream beds. Development of the various seres or stages depends on the development of the soil.—B. I. Judd.

7198. KIELHAUSER, GUSTAV E. Zur Oekologie des Quercetum galloprovinciale pubescentetosum. Oesterreich. Bot. Zeitschr. 88(1): 24-42. 1939.—The above community, a subassociation of the climax Quercetum ilicis galloprovinciale, and characterized by 17 differential spp. of which 13 belong to the "Quercion pubescentis petraeae (=sessiliflorae)" limited in the Mediterranean countries to the mountains, thus being a subassociation with a "Mediterraneo-montane character," was examined on diluvian terraces of glacial "Flussgeschiebe," sands and clays, in

Bas Languedoc (southern France). The subassociation prefers a northerly exposure. Its soil is similar to "red ground," being deprived of limestone and the pH varying from acid to neutral in the various strata. The content of SiO₂ is greater (83-94%) than in red ground above limestone (54-61%). The content of $Al_2O_3 + Fe_2O_4$ is less than in red ground, and far less constant in the various strata. The physical characters of the soil are a high specific gravity and a low degree of aeration; in the lower strata lower temp. and a strong water-holding capacity. Being related to podzol, it should be termed (according to Braun-Blanquet) a "slightly podzolated red-ground soil" (schwach podsolierter Roterdeboden). It is supposed that the physical characters of the soil, especially the water holding capacity, enable that community to subsist in a climate less favorable to it, thus it would be an edaphic paraclimax which, under the given conditions, can exist beside the climax.—M. Onno.

7199. KITTREDGE, JOSEPH Jr. The forest floor of the chaparral in San Gabriel Mountains, Calif. Jour. Agric. Res. 58(7): 521-535. 1939.—Coverage and certain physical properties of the forest floor are analyzed for 25 communities and various groupings of the spp. in 2 areas, one, in a 15year burn at 3000 and the other, more than 50 years unburned, at 5000 feet elevation. Wide variation within communities is characteristic so that differences between their means are often not significant. Mean dry weights per acre ranged from about 3 to 21 metric tons, volume weights from 0.08 to 0.36, field moisture capacities from 125 to 191% and depths of water retained from 0.04 to 0.29 inch. The latter figures give an indication of the amount of water that might be held subject to evaporation after each rain.—

J. Kittredge, Jr.

7200. KITTREDGE, JOSEPH Jr. The annual accumulation and creep of litter and other surface materials in the chaparral of the San Gabriel Mountains, Calif. Jour. Agric. Res. 58(7): 537-541. 1939.—Collections were made in 1935, 1936, and 1937 from 118 wire-bottomed trays, 3 feet square, placed to sample 19 communities in 2 canyons, one at 3000 and the other at 5000 feet elevation. The average annual accumulation for different communities varied from 0.2 to 1.4 metric tons per acre and in different years, from 50 to 150% of the 3-year average. The ratio of total forest floor to the annual accumulation ranged from about 8 in 18 year old stands to 26 in stands over 50 years old. Leaf material constituted from 36 to 67% of the annual accumulation. Sufficient creep took place annually to over-ride the 2-inch barrier formed by the upper sides of the trays and to indicate such movement was occurring on about 17% of the area.—J. Kittredge, Jr.

7201. KLIKA, JAROMIR. Das Klimax-Gebiet der Buchenwälder in den Westkarpathen. Beih. Bot. Centralbl. Abt. B 55(3): 373-418. 2 maps, 2 fig. 1936.—The Carpathians are a natural climax region of beech forests. The "Grosse Fatra" a range of the Fatra group was chosen for study. Their geographic limits, geological structure, and climatic relations—temperature, precipitation and solar radiation—are discussed. The altitudinal distribution of the forests is also given. The forests consist of the following associations: I. The beech alliance with one association Fagetum carpaticum Fatrae occurs on the most favorable soils and there forms the climax. To it belong the subassociation with Allium ursinum and the subassociation with Carex alba which occupies large areas and is a developmental stage. The effect of agricultural encroachment on this association and its degradation and progressive stages after clearing are indicated. Other subassociations in less favorable locations are: Elymus europaeus with frequent Acer pseudoplatanus, Aceretum pseudoplatani Fatrae, Fagetum montanum carpaticum Cortusae, and Fagetum nudum. II. The Piceion excelsae alliance as original stands is limited to siliceous subsoils and higher situations. Forestry has also led to its development in lower places. Its subassociations are: the Piceetum excelsae filicetosum and its facies with Athyrium alpestre and with A. filix femina, and Piceetum excelsae myrtilletosum and the facies with Vaccinium myrtillus and with Calamagrostis vilosa. III. The pine association (P. mughi) occurs rarely in the Grosse Fattra. The floristic composition, ecological (edaphic and biochemical) conditions, rejuvenation and development are given for each association.—Auth. summ. (tr. by H. F. Bergman.)

7202. KLIKA, JAROMIR. Xerotherme Pflanzengesell-schaften der Kováčover Higel in der Südslowakei. Beih. Bot. Centralbl. Abt. B 58(3): 435-465. Map, 1 pl., 1 fig. 1938. —The Kováčover Hills, the westernmost extension of the Hungarian Mitteldonau Hill lands, are characterized not only by floristic richness but also sociologically by their plant associations. Microclimatic and edaphic influences come into operation. Climatic data are given. In the order Brometalia, alliance Festucion vallesiacae, 7 initial stages are recognized for the 2 typical communities: the Festuca pseudodalmatica-Minuartia glomerata community and the Festuca vallesiaca-Ranunculus illyricus community which appear fragmentarily on deep loess and sand soils with large amounts of Ca. The order Quercetalia, alliance Quercion pubescentis has only the Quercus pubescensfraxinus ornus community in extremely warm and dry situations on nearly neutral soils. It is floristically rich; in its succession it is connected with the previously named communities. The order Fagetalia, alliance Eufagion has only the Querceto-Carpinetum in which the subassociation the Querceto-Carpinetum caricetosum pilosae occurs in the Kováčover Hills in several xerophile and moister local variations (west or northwest exposure or in moist ravines).

-Auth. summ. (tr. by H. F. Bergman).

7203. LINDQUIST, B. Dalby Söderskog. [The Southern forest of Dalby.] [With Ger. summ.] Acta Phytogeograph. Suecica 10. 1-273. 99 illus. 1938.—The broad-leaf forest in question is now a natural reservation (Prov. Scania, Sweden). It comprises some traces of very ancient habitation. Later, in medieval times, it was utilized as pasturage for horses belonging to the Dalby monastery. On the discontinuance of this practise the open glades were rapidly transformed to dense hazel copses. On the establishment of a government stud, the forest was once more opened up for grazing purposes. After the wars in the beginning of the 18th century there was less grazing and a new generation of trees came up. The next generation of trees dates from the beginning of the 19th century when extensive lumbering operations were carried out and conditions for regeneration became favorable. The forest was then left undisturbed until 1900, after which year great quantities of wood were cut, chiefly for fuel, until 1917, when the forest was declared a reservation.—The soil is clayey, rich in lime, but resting on poorer drifts. A critical evaluation shows that the forest at present consists chiefly of *Quercus* and *Ulmus* with smaller amounts of *Fagus* and *Fraxinus*. The oak seems to be over-represented; left to itself, the forest would certainly change in composition, oak and beech disappearing while elm and ash gained ground. The present composition is the combined result of grazing and forest-management operations. The oak can regenerate freely on rather acid, dry soil only, such as was present earlier when trees were cut and under-growth grazed. The other spp. regenerate better on eutrophic, subneutral substratum in shade. Oak cannot maintain itself on eutrophic soil at present.—Even beech is losing ground in the forest as its regeneration is successful on light clays only, which are not too moist. Elm regenerates continually in the forest (while the two others only propagate themselves when the ground is cleared) and is gaining ground. Ash has a fair chance on moist soil; at present it is over-represented.—In the brushwood the hazel is able to maintain its position and even to form such dense copses as to preclude the regeneration of the trees incl. elm.—The "förna" (vegetable debris) consists chiefly of leaves from the trees, covering the ground with 5-10 cm loose material in the autumn, or 0.3 kg/m² on the average. Elm förna decomposes very rapidly, having disappeared almost totally in May, while the oak and beech förna decompose slowly; immediately before the next fall of leaves still 32 and 15% were left from last year. Ash and hazel forna occupy intermediate positions, 45, resp. 31% present in May, nothing in August. The oak, elm and hazel forna are subneutral and contain great amounts of P₂O₅; the oak and beech förna are acid and contain less P₂O₅.—The number and weight of earthworms in 17 sq. m plots are given, Allolobophora caliginosa, Eisenia rosea and Lumbricus rubellus being dominant (40, 31 and 15%). Microbiological de-

composition is especially important with regard to beech and oak förna, the others being devoured by the earth-worms before the microbiological processes have made serious attacks. Also the spring flora (Anemone nemorosa, Allium ursinum, etc.) förna is mainly decomposed microbiologically. Through attacks of insects, snails, slugs, etc. considerable amounts of fresh vegetable matter are transferred directly to humus without passing the förna stage.— The earth-mould is divided in granular mould 4-22 cm The earth-mould is divided in granular mould 4-22 cm thick on top, immediately below forna, and amorphous mould 5-50 cm underneath. The upper consists chiefly of humus, the lower of humus + mineral matter. pH of mould layers 6.8 (-6.5), of minerogenous subsoil 6.7-7.3. Ca, 200-300 mg/kg, and P_2O_5 , 150-400 mg/kg are rather evenly distributed in the soil profile, the latter with a slight concentration toward lowest layers, while K and NO₃ are concentrated in the upper layers 16-21 resp. 120-140 are concentrated in the upper layers, 16-21, resp. 120-140 mg/kg against 2-4, resp. 10-57 in the lower mould layer and unchanged subsoil.—Spp. belonging to cultivated fields and which came in during logging operations 1914-16, have disappeared to a great extent already and are going to disappear totally in the future. Spp. of meadows are able to maintain their position in places where tree growth is hampered. A number of typical forest herbs, which are common in surrounding woods, are not represented in D.S., probably owing to the previous pasturage. Total number of phanerogams in 1925, when this investigation was inaugurated: 255, in 1935: 204, decline ca 20% except for phanerophytes, 7%, and therophytes (cultivated fields), 60%.—Vegetation units are synusia, societies, which are combined to the following unions: 1: Anemone nemorosa-Oxalis union on mesic soil in oak and beech forest. 2: Anemone nemorosa-Ranunculus ficaria union on moist soil in ash, elm and oak forest. 3: Ranunculus ficaria union on wet soil. Several societies are described in spring and summer aspects. Analyses of 17 permanent quadrats demonstrate the decrease of the covering of usual grasses and herbs with increase of covering in upper strata. Covering of spring herbs has, however, increased.—K. Faegri.

7204. LÜDI, W. Beitrag zu den Beziehungen zwischen Klimaxvegetation und Boden in Marokko. Veröffentl. Geo-bot. Forschungsinst. Rübel 14: 222-258. 3 pl. 1939.—Soil profiles were studied in places where the climax vegetation was supposed to be comparatively undisturbed. Several types were studied, ranging from semihumid to arid. Semihumid: Cedrus atlantica forest, Cedrus-Juniperus thurifera forest, Quercus ilex forest and Q. suber forest (the latter in a semiarid climate). The upper horizon (A₁) of these forests contains considerable humus (partly colloidal) and has generally lost most of its original lime content; the latter applies also to the A₂ horizon, which looks like the ordinary brown soils of Europe. The soils are neutral or slightly alkaline locally, especially in places where vegetation is degraded, slightly acid (lowest pH value 6.16). No indications of a podzolization were observed. In the drier parts of this same region the humus contents are smaller and the lime has not been washed away from the upper layers, reaction is decidedly alkaline, even where the bed-rock does not contain lime. On limestone may sometimes be found small lime concretions in the upper soil layers.—Semiarid: Quercus ilex forest, Juniperus thurifera forest, Callitris articulata forest. Soils have a smaller, but distinct concentration of organic matter in the brown A1 layer. Lime concentrates to concretions in a subsuperficial layer. Reaction is distinctly alkaline.—Arid: Callitris forest, Argania spinosa forest, Zizyphus lotus-Acacia gummifera brush-wood. The limestone concretions form a continuous layer 30-50 cm. below the surface, even on granitic bed-rock, in the latter cases due to CaCO₃ content of circulating groundwater or windborne dust. The undisturbed surface shows a dark A1 layer with some humus. In extreme cases even chlorides and sulfates are found in the upper layers.—In undisturbed state all these soils bear forests or brush-wood. Arid soils and unripe minerogenous soils in more humid regions have in common a higher conc. of electrolytes in the ground water; the plant-communities of unripe soils are often more xeric than the climax communities, and the climaxes of arid regions occur locally in places with abnormally high electrolyte conc. in less arid regions. The soils of Morocco

are old, dating back to the tertiary; some of the features described may have developed under climatic conditions different from the present. The effects of pasturing, foresting, cultivation, etc. have largely been a degradation of the soil.

7205. McCULLOCH, WALTER F. A postglacial forest in central New York. Ecology 20(2): 264-271. Map. 1939. -Study of pollen deposits in a bog near Syracuse, New York, indicated the presence of a postglacial coniferous forest which was gradually replaced by hardwoods. This finding confirms, for the Eastern Great Lakes, a forest sequence established by other investigators in Ohio, Michigan, Illinois, Wisconsin, and Minnesota. The customary method of separating peat from pollen by chemical means

metnod or separating peat from pollen by chemical means was supplanted by a mechanical dispersion of the materials.—W. F. McCulloch.

7206. MAIRE, R., et L. EMBERGER. Notes sur le programme de l'itineraire botanique executée par les membres de la 8ème I.P.E. Veröffentl. Geobot. Forschungstont Philog. 14.5.24 1030. Disput with acceptance de des la second per les membres de la 8ème I.P.E. Veröffentl. Geobot. Forschungstont Philog. 14.5.24 1030. Disput with acceptance de details. inst. Rübel 14: 5-34. 1939.—Diary with remarks on stations, vegetation and collections.—K. Faegri.
7207. MATTICK, FRITZ. Aufruf zur Mitarbeit an der

pflanzengeographischen Kartierung Deutschlands. Oesterreich. Bot. Zeitschr. 88(1): 62-63. 1939.—The mapping of plant areas was begun in Germany in 1922. It will be extended to Austria, and collaborators are invited to communicate with "Zoologisch-Botanische Gesellschaft" at

municate with "Zoologisch-Botanische Gesellschaft" at Vienna, which is the local organization.—M. Onno. 7208. MOLINIER, R., et P. MÜLLER. La dissemination des especes vegetales. Rev. Gén. Bot. 50(590): 53-72; (591): 152-169; (592): 202-221; (593): 277-293; (594): 344-358; (595): 397-414; (596): 472-488; (597): 532-546; (598): 598-614; (599): 649-670. 45 fig. 1938.—To the static view of vegetation, the authors add the dynamic view which depends on the vegetity of plants. A disperse is defined as depends on the vagility of plants. A diaspore is defined as any of the complexes (embryo, seed, flower, inflorescence, etc.) separable from the mother plant and assuring dissemination. 6 types of diaspores are recognized, ranging from embryos alone to whole plants. The adaptations of diaspores favoring dissemination are grouped under 4 types: 1) morphological and anatomical characteristics facilitating elevation and transport of diaspores; 2) color and perfume, attracting animals; 3) favorable position on the plant; 4) concordance between adaptations, the period favorable for dissemination and that of the maturity of the seeds. Plants are classified according to their mode of dissemination. In each class the efficiency of the dissemination depends not only on the activity of the agent of dissemination but also on the adaptive value of the characteristics realized by the species. 6 main classes, with several subdivisions, are recognized and named after the agents of dissemination, as follows: I. Anemochores, II. Hydrochores, III. Zoochores, IV. Anthropochores, V. Autochores, VI. Barachores. The sub-divisions of each class are descr., their efficiency discussed and examples given. The major portion of the paper is given over to a characterization of the plant communities from the point-of-view of the percentage composition of the floristic assemblage in terms of types of disspores. Over 500 spp. enter into the composition of the associations of the alliances of the French Mediterranean region considered by the authors. In general, each family has a principal method of dissemination, with other methods more or less secondary, Anemochores are most numerous, 59.2% of the spp. having this type of adaptation for dissemination; zoochores are next with 36.8%, followed by anthropochores, barochores, autochores, and hydrochores. Polychores make up 15.8% of the species .- S. A. Cain.

7209. OSBORN, F. G. B. Some comparisons between the vegetation of Morocco and Australia. Veröffentl. Geobot. Forschungsinst. Rübel 14: 168-191. 2 pl., 4 fig. 1939.— Morocco and the central part of S. Australia occupy similar geographical positions and their climates are similar as demonstrated by graphs. Precipitation curves are more extreme in Morocco, the rainfall being concentrated in the winter to a higher extent than in Australia; hence crops can be grown in places with a lower total precipitation in Morocco than in Australia. Effects of the activities of man are less prominent in Australia. Some vegetation types met with in Morocco and there generally supposed to be due to

anthropogenous influence (degraded forests) are also found in a primeval state in Australia. It seems to indicate that they might be so even in Morocco; this applies especially to treeless plains on alluvial soil. Soil types are also similar in the 2 districts, e.g., the croûte desertique soil recalls the important mallee soils of Australia. Comparisons between a number of communities from both regions demonstrate that in spite of great differences in floristic composition (e.g., Quercus suber versus Eucalyptus spp.), the general impression of vegetation is the same in districts of a similar climate. The principal difference is found in the more arid parts, the extensive Stipa tenacissima steppes Morocco having no equivalent in Australia.—K. Faegri.

7210. PIJL, L. van der. The re-establishment of vegetation on Mt. Goentoer (Java). Ann. Jard. Bot. Buitenzorg 48(3/4): 129-152. 2 pl. 1938.—The ash and the lava on the slopes of Mt. Goentoer show remarkably slow revegetation. Since the eruptions of 1847 only in the nebulous zone about 1400 m, has a low and thin forest developed on the virgin soil. It has a peculiar composition and lacks the usual pioneer trees with the exception of some *Ficus* spp. The summit (1700-1950 m) bears a heath vegetation without *Vaccinium* and the lower part (750-1000 m) is still a grass steppe of Arundinella setosa, wherein Heptapleurum (Scheffera) rigidum is the pioneer of the forest. The basaltic material seems to weather so slowly that it is even too poor for Saccharum spontaneum and Imperata koenigii. The new vegetation is in many other respects different from that on Krakatau, which island is not so much a model of revegetation as of recolonisation. The first stages on Mt. Goentoer were not algae and ferns but mosses and epiphytic plants such as orchids.-L. van der Pijl.

7211. PURER, EDITH A. Ecological study of vernal pools, San Diego County. Ecology 20(2): 217-229. 1 fig. 1939.—The flora of vernal pools in various portions of county is strikingly different from that of the surrounding areas. Almost all plants are fragile annuals, flowering in areas. rapid succession from March to May as the pool areas change from hydric to extreme xeric conditions. List quadrats show a density of from several thousand plants to 50 per square meter.—E. A. Purer.

7212. ROLL, HARTWIG. Neue Pflanzengesellschaften aus ostholsteinischen Fliessgewässern. Ein Beitrag zur Kenntnis der Wasserassoziationen. Beih. Bot. Centralbl. Abt. B 58 (3): 466-475. 1938.—Plant associations in streams of slowly flowing water, in which the flow varies from 20-130 cm./sec., are described. The streams are mostly rich in nutrients and have a high lime content with a reaction of pH 7.5-8.6. All the communities described belong in the order Potametalia in which the characteristic spp. are: Lemna trisulca, Potamogeton lucens, P. perfoliatus, Ranunculus divaricatus. In the Potamion eurosibiricum alliance one community, Beruletum angustifoliae submersae, is described. Three communities, Sparganietum ramosi, Phalaridetum arundinaceae holsaticum, and Glycerietum aquaticae holsaticum, are included under the Phragmition alliance. The characteristic spp. and other spp. occurring with them in each association are listed.—H. F. Bergman.

7213. ROMELL, LARS-GUNNAR. The ecological problem of mycotrophy. Ecology 20(2): 163-167. 1 fig. 1939.—In a trenching expt. in spruce forest, Lactarius glyciosmus and several other fungi occurred in rows just outside of the trenches but were absent on all the 31 trenched areas. From this and other evidence, it is concluded that the obligate mycorhizal fungi of conifers are nutritively parasites on their host trees, yet are useful to these in building up an efficient absorbing system with moderate expenditure of assimilates. This reciprocal relation is contrasted with the apparently parasitic relation of orchids to saprophytic soil fungi. The monotropas, it is suggested, may form a 3d type by being nutritively epiparasitic on trees associated to the same mycorhizal fungus.—L. G. Romell.

7214. RÜBEL, E., und W. LÜDI. Ergebnisse des Internationalen Pflanzengeographischen Exkursion durch Marokko und Westalgerien 1936. Veröffentl. Geobot. Forschungsinst. Rübel 14: 1-258. 1939.—A collection of reports, abstracted separately.

7215. RÜBEL, E. Bericht der Permanenten Kommission der I. P. E. Veröffentl. Geobot. Forschungsinst. Rübel 14: 35-39. 1939.—Drs. Rytz and Liidi have been elected new members of the commission. Schröter and Rübel have resigned. Schröter and the only remaining member of the old commission, Brockmann-Jerosch, died in February, 1939.—K. Faegri.

7216. SIPLE, PAUL A. The Second Byrd Antarctic Expedition—Botany. I. Ecology and geographical distribution. Ann. Missouri Bot. Gard. 25(2): 467-514. 6 pl. 1938.—Brief geographical description of regions explored in Marie Byrd Land, King Edward VII Land, and the Queen Maud Mts. where plants were collected on nunataks. Records are given of geological, glacial, light, temp., wind, precipitation, evaporation, and available moisture factors of the environment. Floral lists are given for each locality where collections were made. Lichens and a fungus (Hormiscium) were found in the Queen Maud Mts., the farthest south that living plants are known. 89 spp. of lichens and 5 mosses were determined from the collections. All spp. are endemic to Antarctica, but there are very few endemic genera. The collections of the expedition include mosses, lichens, fungi, algae, and bacteria.—F. R. Fosberg.

7217. STAMM v. SCHLEITHEIM, E. Die Eichen-Hain-buchenwälder der Nordschweiz. Beitr. Geobot. Landesauf. Schweiz. 22. 1-164. 1 illus. 15 pl. 1938.—The Querceto-Carpinetum has been considered the climax community of N. Middle Europe. 4 subass, are described (Alnetosum, Fagetosum, Calcareum, Acidiphilum). Character spp. are Carpinus betulus, Potentilla sterilis, Pulmonaria officinalis, Carex pilosa, C. brizoides, C. umbrosa, Scilla bifolia, Ranunculus auricomus (some varieties), Dactylus aschersoniana, Helleborne purpurata, Lathrea squamaria. With the exception of Carpinus, all have a wide distribution outside the area of the Q.-C., where they belong to quite different assoc. Carpinus prefers deep, stable, eutrophic soils, but cannot compete with beech on the best types, typical Carpinus forests are therefore found on soil with little or no lime and in places where spring-frosts prevent the growth of Fagus. It does not reach the upper limit of Fagus, but goes further down in the SW European lowlands. Many of the character sp. mentioned are often considered typical beech-forest plants, but a survey shows that they occur more frequently in Q.-C. communities. The distribution and ecological demands of the plants mentioned are given. Many so-called constants (occurring in more than 60% of the analyses) such as Hedera helix, Viola silvestris, V. riviniana, Polygonatum multiflorum, Crataegus monogyna, C. oxyacantha, all occur in more than 85%.—The Q.-C. occupies an intermediate position between the typical Quercus-Tilia-Acer mixed forests and the more montane Fagus-Abies forests, but must be considered part of the former. The subass. constitute continuous transitions toward other ass., the Q.-C. alnetosum toward Alnetum (Fagus-Abies forests), Q.-C. fagetosum toward Fagetum (do.), Q.-C. calcareum toward Querceto-Lithospermetum and Q.-C. acidiphilum toward Querectum medioeuropaeum, the regular, monotomous oak forests of Middle Europe with no hornbeam.—In higher parts of its area the Q.-C. (fagetosum) constitutes a preclimax or regeneration community, conditioned by constant forest-management. The tree layer establishes itself very rapidly, while the undergrowth comes much later. In the Querceto-Lithospermetum area, the Q.-C. (calcareum) occupies the lower parts of the hillsides, on level ground and deeper soil.—Carpinus pollen appears very early in Swiss bogs and the species occupied its present area—or more—in early neolithic time but has hardly ever been quantum. titatively important.—The two main constituents of the Q.-C., oak and hornbeam, have similar ecological demands and are able to regenerate rapidly after being cut or destroyed by grazing animals. This is important as the Swiss Q.-C. forests have been subject to very severe anthropogenous influences. Q.-C. is probably the climax community of dryer regions in N. Switzerland, while Abies alba dominates the climax of moister climates.-K. Faegri.

7218. STOMPS, TH. J. Die Höhenstufen im Atlas. Veröffentl. Geobot. Forschungsinst. Rübel 14: 158-167. 1939. -In the Grand Atlas, Argania spinosa and Callitris articulata constitute the lowest zone, Argania belonging to its The next higher zone is occupied by lower part only. The next higher zone is occupied by Quercetum ilicis, 2000-2500 m. above sea level. The higher

zones are too dry to support sub-alpine or alpine vegetation types like those of M. Europe, *Juniperus thurifera* being the only representative of the sub-alpine conifers. The lower limit of the Quercetum ilicis on the N. side is at 1800 m.; farther down a zone of Cupressus sempervirens and Juni perus phoenicea occurs above the Callitris belt. Argania is not present. Middle Atlas, the lower limit of Querctum ilicis is at 1200 m. (climate more oceanic), the upper at 1800 m. Above comes a zone of *Cedrus atlantica*, representing the sub-alpine conifer belt, upper limit 2200 m. Above this are *Juniperus thurifera* and cushion plants. The dwarf-bush zone of the European lower alpine region is not represented because of the dryness of climate. Comparison with Java shows that the upper forest zone of Java belongs to the sub-alpine and even alpine regions and constitutes a parallel to, e.g., the *Alnus viridis* copses of the Alps. The timber-line in Java (Gedeh-Pangerango mountains) is therefore at 2500 m., not at 4000.—K. Faegri.
7219. VILLAR, EM. HUGUET del. L'aire du Callitris

articulata en Espagne. Bull. Soc. Bot. France 85(1/2): 4-14. 1938.—A study of the present and past distribution of C. a., a relict species in Spain, leads to the conclusion that the steppe theory of Spanish vegetation, proposed by Willkomm and Reyes, must be rejected. The extreme south-east, the driest portion of the peninsula, possesses forests instead of grasslands.—E. L. Core.

OCEANOGRAPHY

7220. NIELSEN, E. STEEMANN. Über die Anwendung von Netzfängen bei quantitativen Phytoplanktonunter-suchungen. Cons. Perm. Internat. Explor. Mer. Jour. Conseil 13(2): 197-205. 1938.—Nets yield samples which are neither definite nor relative values of phytoplankton quantities. Studying 2 stations, both rich in phytoplankton, the net samples of one may be rich in phytoplankton, the other one contains but small quantities. The estimate of quantity is not improved through knowledge of the volumes of water filtered by the net. The number of species always quantitatively retained by nets is small, but the relationship of such species to total quantity of phytoplankton being variable, it is considered inadvisable to employ nets in investigating conditions of production of phytoplankton in the sea.—E. S. Nielsen.

7221. USSING, HANS H. The biology of some important plankton animals in the fjords of East Greenland. Med-delelser om Grønland 100(7): 1-108. 27 fig. 1938.—Vertical plankton hauls were taken at Ella Island and Eskimonaes, East Greenland, in 1931-33. The main reasons for the numerical variation of the different animal spp. during the year are (1) an increase due to reproduction which as a year are (1) an increase due to reproduction which as a rule is limited to the summer half of the year, and (2) vertical migration. These migrations are induced by the yearly variations in light intensity. Among the Copepoda, Calanus finmarchicus, C. hyperboreus and Pseudocalanus minutus become inactive and sink to greater depths when in darkness for a long time; the activity of animals of the Metridic type is independent of the light, consequently they are relatively abundant in the upper water in winter. Both types may show positive as well as negative phototaxis and have a light preference characteristic for the stage and season of the year. Positive phototaxis causes the animals of the Calanus type to ascend to the upper water during spring and early summer. Most spp. have only 1 generation per year. Spawning of most of the spp. takes place in early summer when the production of phytoplankton is greatest. The Copepoda do not feed from Oct. to May, inclusive, but the intestinal tract is filled in summer. Increase in length is correlated with food supply, but only slightly with temp. The size correlation of a copepodid stage after moulting is detd. by (1) the size prior to moulting and (2) the state of nutrition before moulting.—H. H. Ussing.

LIMNOLOGY

(See also in this issue Entries 7180, 7211, 7236, 8357) 7222. GARDINER, A. C. Fresh-water biology and its applications. IV. Some aspects of waterworks biology. Ann. Appl. Biology 26(1): 175-177. 1939.

7223. HUTCHINSON, G. EVELYN. Ecological observations on the fishes of Kashmir and Indian Tibet. Ecol

The net caught 72,750 fish weighing about 71,500 lbs. The total catch amounted to 357 lbs. per a., of which 124 lbs. were game and pan fish, and 233 lbs. were rough fish, chiefly carp (209 lbs.). Making allowance for the small ones which escaped through the meshes of the net, the total fish population was estimated at 365 lbs. per a.—C. Juday.

7237. KUBO, I. Preliminary notes on the stock of the anadromous dog salmon, Oncorhynchus keta (Walbaum).

1. On the catch from the Miomote River. [In Jap. with Eng. synopsis] Bull. Jap. Soc. Sci. Fish. 6(5): 262-265.

1938.—Japanese text; English synopsis. 170 "common" and 22 "silvery" dog salmon sampled Nov. 20-28, 1936, from the Miomote River, Niigata Prefecture. Body measurements, weights, and scale studies do not indicate distinctions between common and silvery dog salmon. Body lengths ranged from 45 to 90 cm. with a mean of 72 cm. approx. Total weights ranged from 1 to 7.5 kg. with an approx. mean of 3.7 kg. Dog salmon ages ranged from 2 to 6 years with the 3-year and 4-year classes predominant as determined from scale readings. Tables give scale measurements as to thickness and distances between 1st, 2d, and 3d winter rings and peripheral margin of scale.—S. J. Hutchinson

7238. LEONARD, J. W. Feeding habits of trout in waters carrying a heavy population of naturally hatched fry. Copeia 1938(3): 144. 1938.—A series of 14 brook trout (Salvelinus fontinalis) and one brown trout (Salmo trutta), ranging in standard length from 87-186 mm., was taken from Sweetwater Creek, Lake County, Michigan, on April 30, 1937. At this time newly hatched trout fry were very abundant in the stream. Despite this fact analysis of the stomach contents of the trout in the series mentioned revealed no trout fry, although presence of two small Cottus sp. showed that fish had been eaten.—J. W. Leonard.

7239. NEEDHAM, PAUL R. Trout streams. Conditions that determine their productivity and suggestions for stream and lake management. x+233p. Frontispiece, 74 fig. Comstock Publishing Co., Inc.: Ithaca, N. Y., 1938. Pr. \$3.— This book combines, in a very readable account, information on the life history, environmental requirements, foods and diseases of 10 of the more important Salmonid game fishes. Research and management methods are discussed and evaluated in terms readily understandable by the intelligent layman; yet accurately enough and in sufficient detail to be of value to the technical student. Strictly handbook materials, such as creel census, fish-scale collection and analysis, and field survey techniques and equipment have been assembled in an appendix. Natural methods of conservation are favored over indiscriminate introduction of non-native species and dependence on artificial hatching and stocking entirely, although it is recognized that artificial propagation has a place in the fisheries program. The need for adequate research in and properly regulated management control of aquatic resources is emphatically presented. Although streams receive most attention, lakes are not neglected. The chapters on Distribution of Trout Foods, Propagation, Stocking and Protection, and Stream and Lake Management should be of especial interest to individuals and organizations interested in promoting better trout fishing. In the bibliography, which contains more than 100 author entries, books of general interest are distinguished from those of a strictly technical character. References to illustrations are set in bold-faced type in the general index.—

L. M. Dickerson.
7240. ORTON, J. H. Oyster biology and oyster-culture, being the Buckland Lectures for 1935. 211p. 57 fig. Edward Arnold and Co.: London, 1937. Pr. 5s.—Part I reviews all that is known of the biology of the oyster, its anatomy, mode of life and general ecology, habits, reproduction and life-history. Part II deals with the economic and commercial side of the oyster fishery, and, at every point, the full bearing of recently acquired scientific knowledge on the

problems facing the industry is clearly and succinctly brought out. The author emphasizes in which directions our knowledge is still incomplete, and suggestions for further research are made freely, particularly on such points as the failure of spat settlement in most seasons on English beds, the still unexplained summer mortality, the rate of spawning in relation to the laying of culch, and the rate of growth and development in relation to temp. The author gives as one of the essential requirements of a good producing cyster bed that there should be a local seasonal temp. range giving frequent probabilities of a maximum temp. in the bulk of the seawater of 64°F, or more, this being the opt. temp. for inducing spatting. He comments on the frequent failure of the spat and considers the cold summers with low water temps. as one of the most important contributory causes.—From review by W. M. Tattersall (courtesy Ann. Appl. Biol.).

7241. SATO, R. On new migratory courses of salmon cleared by the tagging experiments in the fishing ground of northern North Pacific, 1936. II. Oncorhynchus keta (Walb). Bull. Jap. Soc. Sci. Fish. 6(5): 251-261. 1938.—Japanese text; English synopsis. 14 fishes travelled new migratory courses. Salmon were tagged on the east coast of the Kamchatka peninsula as far north as Baron Korf Bay near Cape Obyutorsk. Some were recovered on the E coast of Kamchatka near the points of liberation; others rounded Cape Lopatka to enter streams on the west coast of Kamchatka. Salmon tagged near Simusir Island (Central Kuril group) entered the Sea of Okhotsk to be recaptured along the west shore of Kamchatka and at Tavisk in Okhotskii district. Others tagged near Shikotan Island and Paramusiro Island (Kuvil group) were recaptured at the mouths of streams in the vicinity of Okhotsk.—S. J. Hutchinson.

WILDLIFE MANAGEMENT—TERRESTRIAL (See also in this issue Entry 8844)

7242. DACHNOWSKI-STOKES, A. P. Improvement of unproductive and abandoned peatland for wildlife and related uses. Ecology 20(2): 187-197. 1 fig. 1939.—A distinction is made between areas of peat along river courses, those bordering lakes and ponds, and those occupying flat or nearly level upland under conditions of rising or fluctuating water levels. Among the principal unfavorable effects prevalent in some areas are overdrainage, burning, salt accumulation, differences in the composition and properties of surface materials and variations in the sequence of layers of peat below the surface. The restoration of unproductive and abandoned peatland located with reference to coastal and continental migratory flyways would reestablish resting, feeding and breeding grounds for various forms of wildlife, insure the conservation and use of peat resources to purposes for which they are best adapted, and likewise make an important contribution to the program of submarginal land retirement.—A. P. Dachnowski-Stokes.

7243. NICHOL, A. A. Experimental feeding of deer. Arizona Agric. Exp. Sta. Tech. Bull. 75. 1-39. 16 fig. 1938.—In expts. conducted over a 35-yr. period 38 deer, spp. native to Arizona, were fed to determine the food requirements necessary for growth, maintenance, and reproduction. The coefficient 2.35 multiplied by the hundredweight of deer will give in pounds the amount of air-dry forage removed daily by the deer from the range. Palatability tests, run on 168 native plants, showed that shrubs make a dependable and substantial part of the deer diet, and that the tree forages, grasses, weeds, and annuals are also important. Details of the seasonal availability and palatability of plants represented by 26 spp. of trees, 16 spp. of grasses, 39 spp. of shrubs and vines, 19 miscellaneous plants, and 68 spp. of herbs and annuals are reported in infolded tables.—Courtesy Exp. Sta. Rec.

ANIMAL PHYSIOLOGY, BIOCHEMISTRY, AND BIOPHYSICS

GENERAL

(See also in this issue Entry 7177)

7243A. GOULD, GEORGE M. Pocket pronouncing medical dictionary. 11th ed. Revised by C. V. BROWNLOW. Appendix of useful data. Over 1000 pages. P. Blakiston's Son and Co.: Philadelphia, 1939. Pr. \$2., with thumb index

7244. LUCK, JAMES MURRAY, Editor, and VICTOR E. HALL, Associate Editor. Annual review of physiology. Volume I. vii + 705p. American Physiological Society and Annual Reviews, Inc.: Stanford University P. O., California, 1939.—This new publication is similar in format and outlook to the Annual Review of Biochemistry. Its purpose is to provide year by year résumés of the significant work in the entire field of physiology and thus to supplement the exhaustive treatments of selected topics found in review journals. The contents of this Volume are:—Permeability, by M. H. JACOBS; The Biological Effects of Radiation, by J. H. CLARK; Physiological Aspects of Genetics, by G. W. J. H. CLARK; Physiological Aspects of Genetics, by G. W. BEADLE; Developmental Physiology, by J. NEEDHAM; Growth, by C. B. DAVENPORT, OTTO RAHN, M. E. MAVER, H. W. CHALKLEY and D. M. PACE; Temperature Regulation, by A. C. BURTON; Energy metabolism, by J. R. MURLIN; The Peripheral Circulation, by H. C. BAZETT; Respiration and its Adjustments, by ROBERT GESELL; Muscle, by EMIL BOZLER; The Digestive System, by A. C. IVY and J. S. GRAY; Physiology of the Liver, by FRANK C. MANN and J. L. BOLLMAN; Blood: Physiology of Formed Elements and Plasma; Blood Clotting, by J. HAROLD AUSTIN; Heart, by J. A. E. EYSTER; Electrical Phenomena of the Brain and Spinal Cord, by HALLOWELL DAVIS; The Spinal Cord and Reflex Action, by J. C. ECCLES; Bioelectric Studies of the Excitation and Response of Nerve, by D. W. BRONK and F. BRINK, Jr.; The Autonomic Nervous

System, by J. C. HINSEY: Physiological Psychology: Part I. The Conditioned Reflex, by E. R. HILGARD; Part II. Miscellaneous Topics, by C. P. STONE; Kidney, by HOMER W. SMITH; General and Local Anesthesia, by M. H. SEEVERS; Applied Physiology, by D. B. DILL; and Endocrine Glands: Gonads, Pituitary, and Adrenals, by HERBERT M. EVANS. There is an author and subject index.—H. N. Glassman.

7245. POLONOVSKI, MICHEL. Exposés annuels de biochimie médicale. 1st Série. 268p. Illus. Masson et Cie: Paris, 1939. Pr. 75 fr.—This is a series of 14 articles by 10 authors summarizing certain aspects of biochemical phenomena. The subjects discussed are ammonia in the urine and blood; the mechanism of the oxidation reaction in the living organism; oxidation-reduction potentials in biological systems; the constitution and method of action of diastases; vit. A and provits.; vit. B; gonadotropic and galectogenic functions of the ant. pituitary hormone; transformation of glycogen and lactic acid in muscle; chemically produced cancer; metabolism of the cancerous organism; proteins of blood serum and physico-chemical factor in edema; the lipids and the lipoid substances of blood serum; physiology and metabolism of calcium with the technic for its quantitative determination and diagnostic application; methods of adsorption in biochemistry. The method of chromatography is advocated for the study of substances in solution. Characteristic bands of color develop on passing a solution containing a dissolved substance through a column of an adsorbant, followed by washing with a solvent. In each section the theoretical aspects are discussed and the details of technic are given. The sections are complete and presented in text book fashion, rather than as a review of published articles.-R. Isaacs.

ANIMAL PHYSIOLOGY, BIOCHEMISTRY, AND BIOPHYSICS

OSMOTIC AND COLLOIDAL BEHAVIOR: ELECTROLYTES

Editors: D. I. HITCHCOCK AND G. E. CULLEN

(See also in this issue Entries 7091, 7092, 7120, 7183, 7291, 7293, 7329, 7375, 7391, 7414, 7565, 8727)

7246. ANDERSON, EVELYN, and MICHAEL JOSEPH. Electrolyte excretion studies in rats maintained on low-Na and low-K diets. Proc. Soc. Exp. Biol. and Med. 40(3): 344-347. 1939.—Rats which were reared on a low-Na diet excreted radioactive Na more rapidly than normal rats, and retained radioactive K in greater amts. than normal. In this respect they resembled untreated adrenalectomized rats. The giving of cortin corrected this disturbance. Rats deficient in K excreted radioactive Na at a normal rate but retained radioactive K .- Auth. summ.

7247. ANDERSON, EVELYN, and MICHAEL JOSEPH. Urinary excretion of radioactive Na and K in adrenalectomized rats, with and without salt. Proc. Soc. Exp. Biol. and Med. 40(3): 347-350. 1939.—Radioactive isotopes of Na and K were used to study urinary excretion of these electrolytes in adrenalectomized rats. Adrenalectomized rats, unsupported by salt treatment, had an increased total Na excretion and increased rate of excretion of administered radioactive Na when contrasted with normal animals; the reverse was true of K. Simple access to a 1% soln. of table salt enabled adrenalectomized rats to handle Na and K in a way resembling that of normal rats.—Authors.

7248. BROMAN, TORE. Über die Farbindicatormethode als tierexperimentelle Funktionsprobe des Bluthirnschrankensystems. Skand. Arch. Physiol. 80: 59-79. 1 fig. 1938.-The use of acid dyes as a test of disorders in the barrier between blood and brain tissue is based on the fact that acid vital dyes are only able to penetrate from the blood into the central nervous system by pathological disorders in the permeability of this barrier. The author describes the composition and the doses of the dye solns, and the mode of inj —H. Kalckar. 7249. COSTELLO, DONALD PAUL. The volumes oc-

cupied by the formed cytoplasmic components in marine eggs. Physiol. Zool. 12(1): 13-21. 1 pl. 1939.—The relative volumes occupied by the formed components of centrifuged eggs were calculated for 26 egg species. These formed components (nucleus, oil, yolk, pigment, and other granules) are segregated into definite strata by appropriate centrifugal treatment, and the volumes of these segments can be readily computed. The total volume occupied by the formed constituents, not corrected for the volume of hyaloplasm occupying the interstices between the granules, varies from 40% in the egg of Hydroides hexagonus, to 82% in the egg of Polychoerus carmelensis. Eggs of the following marine species were utilized: Amphitrite ornata, Anisodoris nobilis, Arbacia punctulata, Archidoris montereyensis, Arenicola claparedii, Asterias forbesi, Cadlina flavomaculata, Chaetopterus pergamentaceus, Cerebratulus lacteus, Cumingia tel-linoides, Diaulula sandiegensis, Diplodonta orbella, Echi-narachnius parma, Glycera sp., Hopkinsia rosacea, Hydroides hexagonus, Mytilus californianus, Nereis limbata, Phasco-losoma gouldi, Polychoerus carmelensis, Rostanga pulchra, Sabellaria vulgaris, Strongylocentrotus purpuratus, Styela partita, Triopha carpenteri, Urechis caupo.—D. P. Costello.

7250. FARMER, STANLEY NICHOLAS, and MON-TAGUE MAIZELS. Organic anions of human erythrocytes. Biochem. Jour. 33(2): 280-289. 1 fig. 1939.—The anions and cations of normal and anaemic erythrocytes are discussed. It had previously been demonstrated that in normal erythrocytes $[Base^+] = [Cl^-] + [HCO_3^-] + [Hb^-] + [X^-]$ where X designates hitherto unidentified anions. It was shown that organic phosphates, largely neglected as cell buffers and base-binders, may have a slight buffer and a considerable base-binding function—particularly in anaemias. Acid-soluble P was shown to be much greater in equivalence than X, indicating that part of the acid-soluble P is complexly combined and unionised. In hypochromic microcytic anaemia there is probably relatively less of the complexly combined form. The base-binding and buffering of glutathione appeared to have little significance.—M. Maizels.

7251. GREENWALD, ISIDOR. The antagonism between sodium and magnesium ions in their action upon oxalate ion. Jour. Gen. Physiol. 22(3): 385-390. 1939.—The action of NaCl upon the effect of MgCl, upon oxalate buffer systems, interpreted by Simms as an instance of antagonism of Na and Mg, was shown to be capable of formulation as the effect of increasing ionic strength upon the dissociation of MgC₂O₄ into Mg and oxalate ions.—Auth. summ.

7252. HEILBRUNN, L. V., and KATHRYN DAUGHERTY. The electric charge of protoplasmic colloids. Physiol. Zool. 12(1): 1-12. 1939.—The movement of an amoeba toward the cathode is due to the positive charge of its protoplasmic particles. This is indicated by the fact that, when the protoplasm is made alkaline by treatment with NHOH or NHCl, the particles within the amoeba and the amoeba as a whole may often be caused to migrate toward the anode. The charge on protoplasmic micellae is thus dependent on the pH of the cell interior. When amoebae are placed in concentrated solns. of fat solvents, they tend to move toward the anode, indicating that the charge on their proto-plasmic colloids has been reversed. This is probably due to an effect of these concentrated solns, of fat solvents on the rate of respiration. With decrease in CO2 in the protoplasm the colloidal particles in the protoplasm tend to assume a negative charge. When an electric current is sent through the streaming protoplasm of an Elodea cell, the chloroplasts sometimes tend to move more rapidly toward the cathode; sometimes they move more rapidly toward the anode. The results are taken to mean that the charge on the chloroplasts may be either positive or negative. Under conditions which tend to inhibit or retard photosynthesis, the chloroplasts of *Elodea* were found always to move more rapidly toward the cathode. The conclusion to be drawn is that the typical charge of the micellae of the protoplasmic colloid is positive. This positive charge may be reversed by suitable alkalinization of the protoplasm. Such alkalinization may be produced (a) by the direct addition of alkali to the protoplasm; (b) by reduction in the amt. of CO₂ in the protoplasm as a sequence of a lowered rate of respiration; (c) by reduction in the amt. of CO₂ in the cell as a result of photosynthesis.—Auth. summ.

7253. LOEFER, JOHN B. Acclimatization of fresh-water

7253. LOEFER, JOHN B. Acclimatization of fresh-water ciliates and flagellates to media of higher osmotic pressure. Physiol. Zool. 12(2): 161-172. 3 fig. 1939.—Motility and viability limits were observed during exptl. attempts to adapt 5 spp. of fresh-water protozoa to artificial sea water. Bacteria-free strains of Colpidium campylum, Glaucoma piriformis, Chlorogonium euchlorum, Euglena gracilis and Astasia sp. were used. The culture medium consisted of various dilutions of a Van't Hoff soln. to which 0.2% Bactotryptone and 0.01% Difco Yeast extract were added. They were successively transferred to increasingly concentrated salines. Time of exposure and growth in media ranging from 1, 5, 10, 15 . . . 100% varied from 24 to 200 hrs., pH was 6.7. Several series were carried through 11-15 transfers. Astasia was never motile above a 40% Van't Hoff medium, but was viable even after 200 hrs. exposure to 100% Van't Hoff soln. Euglena developed no appreciable tolerance (40%). It withstood 35% on direct transfer. The viability of Chlorogonium increased from 40 to 65%. Glaucoma, at first viable from only 40% was finally viable from a 70% medium. The acclimatization of Colpidium was greater; its tolerance increased from 30 to 95% Van't Hoff soln. The total salinity of the latter is higher than

that of ordinary sea water. All organisms, except perhaps Astasia, developed their tolerance only gradually through a number of generations. The transfer from the concentrated soln, back to the lower salinities could be made without fatal results. Decreased size and fewer contractile vacuole pulsations were observed in organisms from the media with relatively high salt content. The literature on osmotic tolerance is reviewed and discussed.—J. B. Loefer.

7254. MANERY, JEANNE F., and A. BAIRD HAST-INGS. The distribution of electrolytes in mammalian tissues. Jour. Biol. Chem. 127(3): 657-676. 3 fig. 1939.—A direct relation exists between chloride and Na, and an inverse relation between chloride and K in many mammalian tissues, when allowance is made for blood and fat. Deviations do occur. Mammalian tissues may be grouped as those which have a large proportion of chloride-free cells—these have Na:Cl ratios equivalent to an ultrafiltrate—and those which have a large proportion of chloride-containing cells, and contain chloride in excess of Na.—I. R. Williams.

7255. SASLOW, GEORGE. Osmotic pressure of gum acacia solutions. Proc. Soc. Exp. Biol. and Med. 40(2): 277-281. 1939.—The colloid osmotic pressure of several samples of 6% acacia in 0.9% NaCl has been detd. to be 246 to 260 mm. H₂O at 20° C. This value is approx. the same as the avg. colloid osmotic pressure of human sera containing 6-8% protein, namely 276 mm. H₂O. Acacia soln. processed by the procedure of the Lilly Research Labs. appears to be a stable and uniform product.—G. Saslow.

7256. STAUNIG, K., und J. LOEBERING. Über einen biologisch-physikalischen Roentgeneffekt. Kolloid Zeitschr. 84(3): 319-323. 1938.—The swelling capacity of several animal tissues is modified by X-ray treatment. This change is irreversible and is due to the macromolecular structure of the swelling substances, not to the biological (cell) structure. The importance of this X-ray effect for the medicine lies in the possibility of a submicroscopic method of testing and in the consideration of the X-ray therapeutical problems from the point of electro-osmotic compensation.—M. Neuhof.

7257. WILBUR, KARL M. The relation of the magnesium ion to ultra-violet stimulation in the nereis egg. Physiol. Zool. 12(2): 102-109. 2 fig. 1939.—Sea-water-MgCl₂ mixtures reversibly inhibit germinal-vesicle breakdown produced by ultra-violet irradiation. The breakdown of the germinal vesicle can be inhibited by the addition of MgCl₂ subsequent to irradiation. The inhibitory action of the MgCl₂ can be overcome by increasing the period of irradiation. The action of MgCl₂ is antagonized by CaCl₂. Germinal-vesicle breakdown and polar-body formation occur spontaneously in magnesium-free sea water.—Auth. summ.

7258. WILDE, W. S. The distribution of potassium in the cat after intravascular injection. Jour. Biol. Chem. 128(1): 309-317, 1939.—K (15 mg./Kg.) as Cl or SCN was quickly injected into the carotid artery or popliteal vein of 17 cats anesthetized with dial. The resulting increase in conc. of K in the plasma ($\Delta K = x$ mg. per 100 cc.) was detd. at intervals thereafter. The vol. of distr. of the K ($V_{\rm K}$) in % of the body wt. was thus calculated for each time from the formula $V_{\rm K} = 10$ A/xW where A/W=mgm. K injected per kg body wt. The K left the plasma very rapidly, reaching a minimum in 15-25 mins. with a $V_{\rm K} = 68\%$ of the body wt., and rising again to a significant maximum at about 40 min. with a $V_{\rm K} = 48\%$. This typical behaviour was not apparently affected by several variations in the procedure, especially tying the ureters. The injected K might diffuse uniformly into all the body water but it seemed more probable that it was concentrated in some cells and absent from others.—W. S. Wilde.

ANIMAL PHYSIOLOGY, BIOCHEMISTRY, AND BIOPHYSICS

ENZYMES AND CATALYSTS

K. G. FALK, Editor

(See also in this issue Entries 7353, 7380, 7449, 7583, 7692, 8137, 8587)

7259. ADLER, ERICH, HANS v. EULER, und GUNNAR GÜNTHER. Dehydrasen und Jodessigsäure. Skand. Arch. Physiol. 80: 1-15. 1938.—The inhibition of glycolysis by

iodoacetic acid discovered by Lundsgaard was due to an inhibition of the oxido-reduction of triosephosphate (Emden). The oxido-reduction of the glycolysis, consisted of 3

PALEOBOTANY

EDWARD W. BERRY, Editor

(See also in this issue Entry 8422)

8368. CALDER, MARY G. On some undescribed species from the Lower Carboniferous flora of Berwickshire; together with a note on the genus Stenomyelon Kidston. Trans. Roy. Soc. Edinburgh 59(2): 309-331. 2 pl., 25 fig. 1938.—Calymmatotheca kidstoni*, Samaropsis scotica*, and Kalymma tuediana*, from the Calciferous Sandstone Series (Cementstone Group) of Berwickshire, Scotland, are descr.; Stenomyelon tripartitum Kidston is redescr. and shown to be identical with S. tuedianum Kidston.—M. G. Calder.

8369. CARPENTIER, A. Remarques sur des Ptéridospermées. Rev. Gén. Bot. 50(595): 373-377. 1 pl., 1 fig. 1938.—Fragments of a Pteridosperm inflorescence found in the Mines-de-Noeux, Pas-de-Calais, are descr. as Pterispermostrobus striatus; also, a cellular structure comparable to that found in the microspore of Cordaites was found in an to that found in the microspore of Cordates was found in an isolated microspore of Crossotheca crepini. The author points out that it is remarkable that the microspores of Pteridosperms and Cordaitales, which have never been found to have produced pollen tubes, possessed structures homologous to those found in Pteridophytes.—R. Bentall. 8370. GORDON, W. T. On Tetrastichia bupatides: a

Carboniferous pteridosperm from East Lothian. Trans. Roy. Soc. Edinburgh 59(2): 351-370. 6 pl., 3 fig. 1938.—Theoretical considerations suggested that along minor unconformities in volcanic ashes one might hope to obtain examples of the flora and fauna coeval with the period of eruption of the volcanoes and that the plants might be expected to occur in a petrified state. At Oxroad Bay, Tantallon Castle, East Lothian, this theory proved correct; and, among the petrified plants, a new pteridosperm, TETRASTICHIA bupatides, was fairly common. In structure this form is simpler than any other of its class, the axis is cruciform in section and entirely composed of xylem elements. The inner cortex contains sclerotic nests, and the outer many secretory cells and a marked hypoderma with long narrow meshes of fibrous strands. A smooth epidermis containing stomata, the guard-cells flush with the surface, encloses the other tissues. The petioles are inserted almost opposite one another, and are of Lyginorachis type. A marked pulvinus is present, and a bifurcation occurs some $5\frac{1}{2}$ inches from the junction with the stem. Primary pinnae are developed in an alternating series on both branches of the rachis. No lamina and no fructifications have been found in actual continuity with the stems, though synangia that may possibly belong to the plant are present. Correlation is suggested with *Telangium affine* sp. mainly on the grounds of the cortical characters, but this is not stressed meanwhile.

An interesting mineralogical point is the presence of analcime as a petrifying medium.—W. T. Gordon.

8371. LOHMAN, KENNETH E. Pleistocene diatoms from Long Island, New York. U. S. Geol. Surv. Prof. Papers 189-H. 229-237. 1939.—From a total of 222 samples from 30 wells and 11 outcrop samples on Long Island, diatoms were found in 4 samples from 1 well and in 2 outcrop samples. All 3 diatom floras indicate deposition under nearshore marine conditions during a mild climate similar to the present. As all but 1 of the spp. are represented in living floras in about the same latitude, an age no older than some interglacial stage of the Pleistocene is indicated. The similarity of the diatom floras suggests contemporaneous deposition, and a tentative correlation of the Gardiner's clay (from which the outcrop samples came) with the Cape May formation of New Jersey is proposed. No evidence was revealed by these floras for the existence of Miocene beds on Long Island.—K. E. Lohman.

8372. RADFORTH, NORMAN W. An analysis and comparison of the structural features of Dactylotheca plumosa Artis sp. and Senftenbergia ophiodermatica Göppert sp. Trans. Roy. Soc. Edinburgh 59(2): 385-396. 2 pl., 2 fig. 1938.—Fertile pieces of frond of these Carboniferous fernlike compressions found near Barnsley, Yorkshire, were transferred from the rock surface in a cellulose acetate film. From such prepns. the gross structural features of the fronds and their fructifications were examined. Where further detail was required the transfer was macerated and oxidized in Schultze's fluid. This treatment often dissolved away the sporangial wall to expose the spores which appeared in various developmental stages in different sporangia. The sporangium of Dactylotheca, contrary to previous description, is annulate, and similar to that of Senftenbergia. Also from a comparison of size, shape, and arrangement of the sporangia, and of the type of pinnule cutting, it is clear that these 2 fossils are different parts of the same plant; they must both be included in Senftenbergia. The newly disclosed structural features of the fructifications and their contents provide evidence of relationship between the fossil Senftenbergia and the living Schizaeaceous ferns, in particular Aneimia.—N. W. Radforth.

ALGAE

(See also in this issue Entries 7116, 7227, 8371, 8715)

8373. HYGEN, GEORG. Über Gametenkopulation bei der Grünalge Bulbocoleon piliferum Pringsh. Nytt Mag. Naturvidensk. 77: 133-135. 2 fig. 1937(rec'd 2-28-39).—As two gametes united, they moved in rapid, irregular, rotary motion until fused. The 4-ciliated zygote swam slowly and regularly until it reached the culture medium and fastened

itself there.—G. J. Anderson.

8374. KANDA, T. On the gametophytes of some Japanese species of Laminariales. II. Sci. Papers, Inst. Algol. Res. Hokkaido Imp. Univ. 2(1): 87-111. 2 pl., 24 fig. 1938.—Detailed description and illustration of the gametophytes, antherozooids, eggs and young sporophytes of the following Laminariales: Laminaria yendoana, L. cichorioides, L. yezoensis, Kiellmaniella crassifolia, and Chorda filum.—

G. M. Smith

8375. KUSUNOKI, SEIKAN. Untersuchungen über die Geschlechtszellen von Spirogonium stricticum Kutz. Cytologia, Fujii Jub. Vol. 850-856. 1 pl., 1 fig. 1937.—In this form, closely related to Spirogyra, there is no morphological difference between gametes before conjugation. The cytoplasm of the d gamete contracts first in conjugation. Both sexes are present in a given filament. Parthenogenetic zygote production was observed in some filaments.—H. Hibbard.

8376. MANGUIN, EMILE. Contribution à la flore diatomique des Nouvelles-Hebrides. Bull. Soc. Bot. France 85 (1/2): 14-19. 3 pl. 1938.—A list of 41 plants collected by M. and Mme. Aubert de la Rue in the New Hebrides in 1935-36, including new forms, vars. and spp. in Eunotia, Stauroneis, and Navicula.—E. L. Core.
8377. MÜHLDORF, ANTON. Beiträge zur Frage über das

Vorkommen von Zellbrücken bei den Cyanophyceen und Rhodophyten. Ber. Deutsch. Bot. Ges. 56(1): 16-25. 1938.— Previously reported absence of plasmodesma in the Chroococcales and Hormogonales. Now reports same for Chamae-siphonales. The cross walls of the latter have no plasma connections regardless of age or physical condition. Author reports no plasmodesma in the cross walls of the Hormogonales Stauromatonema viride but observed small canals. There were no plasmodesma in Nematoplaca. The fresh water red alga Hildenbrandia rivularis has very small canals which traverse the cell walls in many directions. The similarity of these canals to plasmodesma is quite striking but only in outward appearance since they do not cross the middle lamella.—H. C. Beeskow. 8378. POCOCK, M. A. Volvox tertius, Meyer. With notes on the other two British species of Volvox. Jour. Quekett Microsc. Club Ser. 4, 1(2): 33-58. 4 pl., 3 fig. 1938.—A complete account of the morphology, life history, and habitats of V. tertius is given, also a key for differentiating it from V. aureus and V. globator Ehrenberg. 17 references.

-W. C. Tobie.
8379. SCHILLER, JOSEF. Florideen der Ache in Badgastein. (Mitteilung aus dem Forschungsinstitut Gastein Nr. 11.) Oesterreich. Bot. Zeitschr. 88(1): 49-52. 1939.—The fresh-water alga Lemanea fluviatilis, sporadic in the Eastern Alps, was found frequently on certain places in the rocky bed of the "Gasteiner Ache" (Salzburg, German Austria), and in its affluent, the "Palfnerbach," the bed of which is overlaid with stone slabs. Length of filaments seems to develope the state of the control of the contr pend on the depth of water. All individuals from Gastein pend on the depth of water. All individuals from Castelli are striking by their rather dark color. Fructifications are abundant during summer. The epiphytic Audouiniella (Ghantransia) violacea was found on this sp., rarely on the "Ache" itself, but frequently in the conducting-box ("Zuleitungskasten") of the electric works. All plants of it

abound with monospores.—M. Onno.

8380. YAMADA, Y. The species of Liagora from Japan.

Sci. Papers, Inst. Algol. Res. Hokkaido Imp. Univ. 2(1):

1-34. 15 pl., 22 fig. 1938.—A monographic treatment of all 1-34. 15 pl., 22 ng. 1938.—A monographic treatment of an spp. from the waters of Japan. 14 spp., of which 8 are new, are recognized. Each sp. is discussed in detail and the characteristic anatomical and reproductive features of each are figured. There is also a key distinguishing the species one from another.—G. M. Smith.

8381. YAMADA, Y., and E. SAITO. On some culture

experiments with the swarmers of certain species belonging to the Ulvaceae. Sci. Papers, Inst. Algol. Res. Hokkaido Imp. Univ. 2(1): 35-51. 1 pl., 12 fig. 1938.—Sexual and asexual plants of Ulva pertusa are identical in appearance and the sexual plants show a strictly separated sexuality. Fusion of the gametes and germination of the zygote are descr. A parthenogenetic germination of gametes may also take place. The liberation and germination of zoospores are also descr. Neither plants developing from zygotes nor also deser. Neither plants developing from zoospores were grown to maturity. Enteromorpha linza produced both bi- and quadriflagellate swarmers but there was no conjugation of the biflagellate swarmers even when all possible combinations of them were made. Biflagellate gametes are the only type of swarmer produced by Monostroma angicave. Male and 2 gametes are produced on separate plants and the d gametes are

smaller and paler than the Q. The zygote enlarges greatly and after about 8 months its contents divide to form a large number of quadriflagellate zoospores. The zoospores germinate to form typical juvenile *Monostroma* plants. All individuals of *M. pulchrum* produced quadriflagellate zoospores only. They germinated by sending out a germ tube that became inflated at the distal end. All of the protoplasm then migrated into the swollen tip and this portion of the germling enlarged greatly to form a large cyst. After about 8 months the contents of the cyst divided to form many quadriflagellate zoospores. Germination of these zoospores was not followed beyond the 2-celled stage.—G. M.

8382. YAMADA, Y., and T. TANAKA. The marine algae from the Island of Yonakuni. Sci. Papers, Inst. Algol. Res. Hokkaido Imp. Univ. 2(1): 53-86. 13 fig. 1938.—102 algae are reported from this island. They include a new species of Derbesia and a new sp. of Spermothamnion.—G. M.

8383. YAMADA, Y. Observations on Arthrothamnus bifidus J. Ag. Sci. Papers, Inst. Algol. Res. Hokkaido Imp. Univ. 2(1): 113-118. 5 fig. 1938.—Fruiting of this kelp is descr. for the first time. At first there are 2 vertical rows of sori on the under surface of a blade. Later, the sori coalesce and there is also a development of sori on the blade's upper surface. The development of new blades from the pair of auricles at the base of the plant is also descr.— G. M. Smith

8384. YAMADA, Y. Notes on some Japanese algae. VIII. Sci. Papers, Inst. Algol. Res. Hokkaido Imp. Univ. 2(1): 119-130. 13 pl., 4 fig. 1938.—An annotated list of marine algae from various parts of Japan. New species include one each of the following genera: Coilodesme, Sargassum,

one each of the ioliowing genera: Coilodesme, Sargassum, Callymenia, Erythroglossum, Grateloupia, Scinaia, Sebdenia and Sarcodia.—G. M. Smith.

8385. YONEDA, YÜICHI. Cyanophyceae of Japan. III. [In Eng. & Jap.] Acta Phytotax. et Geobot. 7(3): 139-183.
65 fig. 1938.—New species are published in Microcystis, Aphanocapsa, Aphanothece, Gloecapsa, Chroocccus, 65 fig. 1933.—New species are published in Microcystis, Aphanocapsa, Aphanothece, Gloeocapsa, Chrococcus, Merismopedia, Synechocystis, Synechococcus, Oncobyrsa, Stichosiphon, Chamaesiphon, Fischerella, Hapalosiphon, Mastigocladus, Calothrix, Scytonema, Cylindrospermum, Nostoc, Anabaena, Spirulina, Oscillatoria, Phormidium, Lyngbya, Schizothrix, and Symptoca.—E. H. Walker.

FUNGI

Editor: C. L. SHEAR. Associate Editor: EDITH K. CASH (See also in this issue Entries 7060, 7066, 7076, 7107, 7216, 8555, 8604, 8646)

FUNGI

8386. BATAILLE, M. F. Parenté chimique de la Russula xerampelina avec le Lactarius volemus. Bull. Trimestr. Soc. Mycol. France 54(3/4): 253. 1938.—These 2 fungi give the same color reaction when treated with a 10% iron sulfate

soln.—W. A. Jenkins.

8387. BOEDIJN, K. B. A new species of the genus
Podostroma from Africa. Ann. Mycologici 36(4): 314-317.

1 fig. 1938.—P. africanum (Hypocreaceae) from Africa is described. Although no insects were found while digging the specimens, it is suspected that the fungus was associated with termite runs. A key to the 9 species in the genus accepted by the author is included.—L. Dosdall.

8388. CAMPBELL, MARIE E. An investigation of the

Mucorales in the soil. Trans. Roy. Soc. Edinburgh 59(2): 411-436. 3 pl., 15 fig. 1938.—20 heterothallic and 3 homothallic spp. were isolated from samples of 7 soil types. 13 spp. had not been previously isolated in Britain. Zygospores of Mucor racemosus, M. hiemalis, Absidia cylindrospora, Zygorhynchus vuillemini, Z. moelleri and Pintocephalis cylindrospora, 2 new vars. of Z. vuillemini and 1 of Circinella sydowi are described. The positive forms of the Mucorales have a larger distribution than the negative in the soil and the positive mycelia of M. hiemalis are more resistant to drying than the negative mycelia. A table is given showing the longevity in culture of several spp. Perfect hybrid zygospores were obtained between M. varians and M. hiemalis. Imperfect hybridization occurred between A.

cylindrospora and Rhizopus nigricans. There was no specific distribution of species in the different soil types but all assistance of species in the different son types but an soils were not equally rich in spp. M. racemosus and Zygorhynchus spp. withstand a wide range of pH; other spp. are more limited.—M. E. Campbell.

8389. DOBBS, C. G. "Sporangial drops" in the Mucoraceae. Nature [London] 143(3616): 286. 6 fig. 1939.—Contravate the August 148.

Contrary to the common belief that spores in the Mucoraceae are freed immediately upon the bursting of the sporangium, it has been observed that when the sporangium wall bursts in air away from a solid surface, there is formed a "sporangial drop" of liquid containing spores and columella. Spores may then be dispersed by contact with solid objects or the drop may dry down into a solid mass. The 8 spp. examined are not named, except for Dicranophora fulva* and Mucor hiemalis.*—E. K. Cash.

8390. FISCHER, EDUARD (Bearbeitet von). Abteilung: Eumycetes (fungi). Klasse: Ascomycetes. Reihe Euascales, Unterreihe 8. Tuberineae. In: Die Natürlichen Pflanzenfamilien. 2nd enlarged and rev. ed. Band 5b. Herausgegeben von A. ENGLER. Fortgesetzt von H. HARMS. 42p. 22 fig. Wilhelm Engelmann: Leipzig, 1938.—In general form and avrangement the tart commenced with that of the first arrangement the text corresponds with that of the first edition. The illustrations are somewhat more numerous but of the same type. Preceding the taxonomic treatment are 14p. of general discussion of comparative morphology (of vegetative structures, asexual reproduction, ascocarps, asci and ascospores), phylogeny, geographic distribution and

economic significance of members of the group. Three families are recognized, (1) the Geneaceae, embracing Petchiomyces, Genea, Myrmecocystis and Genabea, (2) Eutuberaceae, including Gyrocratera, Barssia, Phymatomyces, Hydnotrya, Daleomyces, Stephensia, Pachyphloeus, Choiromyces, Piersonia, Hydnobolites, Balsamia, Pseudobalsamia, Tuber, Fischerula, Delastreopsis, and Paradoxa, and (3) Terfeziaceae, formerly in the Plectascineae and now containing here the genera Tirmania, Picoa, Terfezia, Mattirolomyces, and Delastria PETCHIOMYCES Ed. Fischer & O. Mattirolo and MATTIROLOMYCES Ed. Fischer are descr. An index to all group names including synonyms is provided, and another to the common names of the various truffles.—H. M. Fitzpatrick.

8391. HAMANT, C. Sur la présence en Moselle des

8391. HAMANT, C. Sur la présence en Moselle des périthèces de Microsphaera quercina (Schw.) Burr. Bull. Mens. Soc. Sci. Nancy 3(8/9): 154-157. 1 fig. 1938.—With a descr. of its morphology.—W. C. Tobie.

8392. HEIM, LUDWIG. Zur Sporenfärbung. Ann. Mycologici 36(4): 327-333. 1938.—The author has found

8392. HEIM, LUDWIG. Zur Sporenfärbung. Ann. Mycologici 36(4): 327-333. 1938.—The author has found the gram stain useful in studying the contents and wall structure of fungus spores, especially those of the Lactariaceae. In some fungi the cell contents are apparently wholly gram-positive, in some only certain portions are gram-positive and others gram-negative. The spore walls, in so far as they take a stain at all, were gram-negative in all the fungi studied. The technique as applied to the staining of fungus spores is given in detail with a summary of the various staining formulae which have been proposed for studying the structure and composition of fungus spores. —L. Dosdall.

8393. HENRY, R. Étude de quelques Telamonias. Bull. Trimestr. Soc. Mycol. France 54(2): 89-110. 1938.—Descriptions are given for each species listed as follows: Cortinarius (Telamonia) gentilis (Fries); C. (T.) rigidus (Scop.); C. (T.) safranopes; C. (T.) scutulatus Fries; C. (T.) pseudoscutulatus n. n. (=C. scutulatus sensu Konrad-Ricken (nec Fries-Quelet et Gillet)); C, (T) veregregius; C. (T.) hillieri, all from France.—W. A. Jenkins.

8394. HENRY, R. Suite à l'étude des Myxacia. Bull. Trimestr. Soc. Mycol. France 54(3/4): 226-241. Illus. 1938.— Five spp. are listed under "species already studied." Under the heading, "New studies," descriptions are given for 3 vars.; one of them, Cortinarius (Myxacium) squamosipes, is new (Saône, France). Cortinarius (Myxacium) elatior and C. (M.) delibutus are also descr.—W. A. Jenkins.

8395. HORN, KRISTIAN. Hydnum septentrionale Fr. i Norge. [With Eng. summ.] Nytt Mag. Naturoidensk. 77: 129-130. 1 fig. 1937(rec'd 2-28-39).—To date, 5 habitats of H. septentrionale have been found in Norway, all in the south-east.—G. J. Anderson.

8396. JØRSTAD, IVAR. Notes on some heteroecious rust fungi. Nytt Mag. Naturvidensk. 77: 105-119. 3 fig. 1937 (rec'd 2-28-39).—Due to the extremely short summer season in the Arctic, the uredo-stage of many long-cycled rusts seems to shorten or even to disappear and the rust becomes monoecious. This is probably true of Puccinia festucae which has been found independent of any species of Lonicera, one of its normal hosts. Neither has the teleuto-stage of Chrysomyxa ledi or of Puccinia poue-sudeticae been found in Finmark. Those definitely heteroecious include: Chrysomyxa woronini, Puccinia uliginosa, Melampsora epitea, M. arctica, and M. lapponum. Puccinia bistortae and P. poae-sudeticae are independent of host alternation.—G. J. Anderson.

8397. KNAUTH, B., und W. NEUHOFF. Die Milchlinge (Lactarii). In: Die Pilze Mitteleuropas Bd. 2, Lief. 8: 25-32. 2 col. pl. 1939.—Descriptions of Lactarius cyathula (cont. from Lief. 6), L. glyciosmus* and L. azonites*; illustrations of L. g., L. a., L. fuliginosus and L. lignyotus.— E. K. Cash.

8398. KÜHNER, ROBERT. Le genre Mycena (Fries). Étude cytologique et systématique des espèces d'Europe et d'Amérique du Nord. With preface by RENÉ MAIRE. Encyclopédie Mycologique 10. 1-710. Illus. Paul Lechevalier: Paris, 1938.—The first 156p. deal with material of a general nature. Chapter 1 defines the genus, 2 describes in detail the techniques used, 3 gives a detailed account of the differentiation of hyphae in various parts of the carpophore

and a discussion of the relative importance of different characters from a taxonomic point of view, 4 assembles the known facts concerning the development of the carpophore, 5 gives an account of the cytology and sexuality, 6 discusses the subdivisions of the genus and 7, its affinities and limits. The remainder of the book is the special contribution presenting keys and detailed descriptions of the 198 spp. studied. The author has seen most of the spp. of France and has extended his study, at least from herbarium material, to almost all of the spp. of N. America. The scope of the work has been broadened further by the incorporation of personal notes on the collections of species of Mycena contributed by the following mycologists: RENE MAIRE, J. FAVRE, M. JOSSERAND, J. SCHAEFFER and A. H. SMITH. In order to avoid the confusion of numerous changes in names the Friesian binomials have been used, together with the citation of the author who first made the spp. recognizable with certainty by describing or illustrating its microscopic characters. The shape and size of spores can be used for the recognition of certain spp., the shape and disposition of the cystidia greatly facilitate the determination of others. The author emphasizes, however, the reaction of the walls of the spores and of the hyphae in various parts of the carpophore with iodine, and the anatomical structure of the trama of the gills, the flesh and covering of the pileus, and the transition zone between the stipe and the pileus as affording characters especially valuable for grouping spp. naturally. The bisporic forms in which the young basidia are uninucleate are considered parthenogenetic forms of normally tetrasporic forms.—The genus is defined to include the white spored agarics with cartilaginous stipes in which the margin of the cap is straight from the beginning (slightly incurved in a few spp.). All spp. of Omphalia having amyloid spores and hyphae and those in which the superficial cells of the pileus cuticle have the structure typical of Mycena are included in Mycena. Mycena is distinguished from Collybia by the straight margin of the pileus and from Marasmius by the iodine reaction. Spp. of Marasmius with amyloid hyphae have spores which do not react with I while most of those of Mycena with amyloid hyphae have amyloid spores also. The genus is divided into 2 subgenera: EU-MYCENA with amyloid spores and hyphae (155 spp., 48 special to N. America) and PARA-MYCENA with spores not amyloid and hyphae amyloid or not (43 spp., 8 special to N. A.). 17 new spp., 3 new vars, and 8 new forms are descr. 2 keys to spp. are offered: (1) a synoptical table of the system of classification using characters deemed most important in indicating relationship with no regard for the difficulties of observation; (2) one of convenience eliminating first the species easily recognized by macroscopic characters and having recourse to microscopic characters only for spp. or groups of species which cannot be distinguished with certainty by other means. In the appendix are listed spp. not known well enough to classify in the present system. List I includes 47 spp. with smooth cystidia for which the I reaction is not known, list 2, 62 spp. for which the character of the cystidia is not known. A 3d list includes 11 spp. excluded from the genus (5 European, 6 American).—L. Dosdall.

8399. LINDTNER, V. Hypomyces porotheliiformis Lindtner sp. n. Ann. Mycologici 36(4): 326. 1938.—The Latin diagnosis is given for this new fungus found in Yugoslavia on Ganoderma lucida.—L. Dosdall.

8400. LOHWAG, H. Mykologische Studien. XIV. Zur Anatomie des Strangmyzels von Gyrophana lacrymans (Wulf.) Pat. Ann. Mycologici 36(5/6): 401-434. 5 fig. 1938.—The interpretations made by Falck (1912) on the anatomy of the strands of G. lacrymans are evaluated critically in the light of the reports of other workers on the same fungus and on other Basidiomycetes, and the author's own observations.—L. Dosdall.

8401. LOHWAG, H. Mykologische Studien. XV. Zum öffnungsmechanismus von Geaster. Ann. Mycologici 36 (5/6): 435-436. 1 fig. 1938.—The outer fibrous layer of the exoperidium of G. triplex is considered the active tissue in the rolling back of the segments since specimens from which pieces of this tissue were removed did not open but when a narrow strip was taken from the equatorial region

the exoperidium immediately split along the exposed area. The shrinking of the outer surface as a result of water loss is supposed to exert the pull and tension causing the meridional tears and reflexing of the exoperidium.—L.

8402. MALENÇON, M. G. Dodgea occidentalis Malencon-8402. MALENÇON, M. G. Dodgea occidentalis Malençon—nouveau genre et nouvelle espèce de Rhizopogoneae. Bull. Trimestr. Soc. Mycol. France 54(3/4): 193-203. Illus. 1938.—Technical descriptions are given (in Latin) for this hypogeous fungus collected by C. W. Dodge in the Selkirk Mountains (alt. 1,200 m.), British Columbia, in 1921. D. occidentalis is perhaps closely related to Rhizopogon; it may supply evidence of a phylogenetical connection between the Rhizopogoneae and the Boletaceae.—W. A. Jenkins.

8403. MURRILL, WILLIAM A. Oligocene island fungi. Bull. Torrey Bot. Club 66(3): 151-160. 1939.—A brief description of this primitive Floridian island, with a discussion scription of this primitive Floridian island, with a discussion of the origin of its fungous flora, is followed by descriptions of n. spp. in the following genera: Lepiota (4), Russula (5), Clitocybe (2), Gymnopus (4), Hydrocybe (2), Hygrophorus, Marasmius, and Marasmiellus.—W. A. Murrill.

8404. PILAT, A. Species nova carpatica generis Flammula Fr. Bull. Trimestr. Soc. Mycol. France 54(3/4): 251. Illus. 1938.—F. croceolamellata, from dead Picea excelsa, Czecho-Slovakia.—W. A. Jenkins.

8405. ROBAK, HÅKON. Om innflydelsen av muggsopper på fruktlegemedannelsen hos skiellsoppen Pholiota mutabilis

på fruktlegemedannelsen hos skjellsoppen Pholiota mutabilis (Schaeff.) Quel. på kunstig naeringsbunn. [The effect of molds on the fructification of Pholiota mutabilis on artificial media.] [With Eng. summ.] Nytt Mag. Naturvidensk. 77: 120-128. 5 fig. 1937(rec'd 2-28-39).—Pholiota mutabilis frucrified normally on beer-wort agar contaminated with Peni-cillium expansum or Cladosporium herbarum, but ab-normally on pure media. The exact nature of this favorable influence is being investigated.—G. J. Anderson.

8406. SIEMASZKO, WICENTLY, et JERZY JAWORSKI. La coloration du substratum dans les cultures du Beauveria globulifera (Speg.) Picard et les bactéries. Bull. Trimestr. Soc. Mycol. France 54(3/4): 245-250. 1938.—With monosociated bacteria rather than to the fungi.—W. A. Jenkins.

8407. SYDOW, H. Neue oder bemerkenswerte australische Micromyceten. III. Ann. Mycologici 36(4): 295-313. 1938.-Two new genera of Ascomycetes are described: FRASER-ULA with F. australiensis on Cryptocarya microneura, PHAEOTHYRIOLUM with P. eucalyptinum on Eucalyptus pauciflora, and 4 new genera of Fungi Imperfecti: PLA-CELLA with P. fraseriana on Aristida armata, MELANO-DOCHIUM with M. australiense on Tecoma australis, HADROSPORIUM with H. fraserianum on decorticated wood, HERPOSIRA with H. velutina on Xanthorrhoea hastile; and new species Nyssopsora citriobati on Citriobatus multiflorus, Ustilago condigna on Themeda avenacea, Phyllachora egenula on Leptospermum lanigerum, P. fraseriana on Triodia mitchelli, Xylobotryum coralloides on Ackama muelleri, Leptosporella macrotheca, Nectria trachylaena, Scirrhia gahniae on Gahnia psittacorum, Pseudolembosia magnifica on Eucalyptus punctata, Asterina xanthogloea on Litsea dealbata, Endocolium palmeriae on Palmeria scandens, Septoria polyadelpha on Brassica sinapistrum; the occurrence of 6 additional unusual spp. is recorded.—L.

8408. SYDOW, H. Mycotheca germanica. Fasc. LXI-LXIV (No. 3001-3200). Ann. Mycologici 36(4): 318-325. 1938.—The species of fungi included in the 4 fascicles issued September 1938 are listed with miscellaneous notes on 14 of the species. Bremia lampsanae on Lampsana communis and Leptosphaeria scitula on Galium aparine are descr.-L.

8409. SYDOW, H. Fungi himalayenses. Ann. Mycologici 36(5/6): 437-442. 1938.—Among the fungi collected in the Kulu, Lahul and Spiti districts of India are listed 35 spp. of Uredinales, 6 spp. of Ustilaginales, 2 spp. of Erysiphe and 1 sp. of Coleroa. The following new spp. are descr.: Ustilago ahmadiana on Polygonum rumiciolium, Puccinia tricholepidis on Tricholepis elongata, P. ahmadiana on Pterotheca falconeri, and Pileolaria indica on Rhus.—L. Dosdall.

LICHENES

8410. ERICHSEN, C. F. E. Neue arktische und subarktische bes. von Dr. E. Hulten und Prof. B. Lynge gesammelte Pertusarien nebst einer Bestimmungstahelle gesammetre Fertisarien lebst einer Bestimmungstabelle arktischer und subarktischer, über Erde und Moosen wachsender Pertusariaceae. Ann. Mycologici 36(5/6): 349-366. 2 fig. 1938.—These lichens were collected on the Aleutian Islands, Kodiak Island, Devon Island, Jan Mayen Island, and Iceland. 9 new spp. and 2 new vars. are descr. in Pertusaria. The name P. tuckermani is proposed for P. glomerata sensu Tuckerman in Syn. North Am. Lichens 1882 (215) and Bruce Fink, The Lichen Flora of the U. S., 1935, (292) since it is different from P. glomerata (Ach.) Schaer.— L. Dosdall.

8411. KÖFARAGO-GYELNIK, V. (Formerly V. GYEL-NIK). Additamenta ad cognitionem Parmeliarum. VIII. Ann. Mycologici 36(4): 267-294. 1938.—The author reports on collections of Parmelia (Lecanorales of the Ascolichens) sent him from the U.S., Canada, Mexico, S. America (Argentina, Chile, Colombia, Peru, Uruguay), Cuba, Hawaii, Japan, Siberia, Australia, and Europe. Descriptions are given for 23 new spp., 19 new forms, and 4 new vars. Since many of the older authors and some of the newer have design nated a yellow color with K as K- in their descriptions, this character must be regarded with caution wherever it is found in the literature. The characteristic color of the xanthoparmelias is yellow green. Variations in color have no systematic value. The black margins reported in previous descriptions are also without systematic value.

8412. LAMB, I. MACKENZIE. What is Lecidea pringlei Tuckerman? Bryologist 42(2): 32-36. 1 fig. 1939.—Lecanora pringlei (Lecidea p. Tuck.). A detailed microscopical analysis, based on co-type material discovered in the Paris Museum Herbarium, is given, and the other spp. of the section Cladodium of Lecanora are discussed, with notes on their distribution. 2 other new combs., transferring to Lecanora spp. formerly in C. and in Polycauliona, are published.—I. M. Lamb.

8413. MAGNUSSON, A. H. Additional notes on Acarosporaceae. Meddel. Göteborgs Bot. Trädgård 12: 87-103. 1937(1938).—This includes notes on Acarospora spp. mainly from New Mexico, from other countries, and spp. of Sarcogyne, growing outside Europe and N. America.

8414. SCHINDLER, HERBERT. Beiträge zur Geographie der Flechten. IV. Ber. Deutsch. Bot. Ges. 56(1): 2-10. 1938.—Calopaca fulgens is a strictly continental form which invades sunny, calcareous slopes in the warmer and drier parts of Germany. It is distributed in the lower courses of the Oder River, in Thuringia, the middle Main basin, and the upper Rhine region. The author believes that it is mainly a Siberian element which has invaded central Europe and northern Africa. It has advanced from the steppes of Russia into middle Europe partly through Hungary and Bohemia where the surrounding mountains have restrained its further advance. The invasion of central Europe occurred through the lowlands between the Oder and the Vistula Rivers and then in a north-easterly to south-westerly direction across Brandenburg, Saxony, Thuringia, the Rhine Valley, Alsace, and the Swiss Alps. The author believes that *C. fulgens* did not invade Europe through the valley of the Danube River. In Germany it is usually found in the same locations as Adonis vernalis and Stipa capillata but is not a part of this association.—H. C. Beeskow.

8415. STEINER, MAXIMILIAN. Bemerkungen über Parmelia Kernstockii Lynge et A. Zahlbr. und ihr Vorkommen in Tirol. Oesterreich. Bot. Zeitschr. 88(1): 43-48. 1939.

—P. k., a species closely allied to P. caperata and known from a number of Alpine and extra-Alpine, even extra-European countries, occurs also in Northern Tyrol, preferring higher situations and belonging sociologically to the Xanthorion parietinae. No apothecia were found. A new shade form is described as f. subglauca (p.44).—M. Onno.

8416. STØRMER, PER. Lav på en hattsopp. [A lichen on a mushroom.] [With Eng. summ.] Nytt Mag. Naturvidensk. 77: 131-132. 1937(rec'd 2-28-39).—Well developed fertile specimens of Coniocybe furfuracea have been found in Norway, growing rapidly over a cluster of dead fungi, probably Tubaria phaeophylla.—G. J. Anderson.

BRYOPHYTA

A. LEROY ANDREWS, Editor

(See also in this issue Entries 7094, 7216, 8423)

8417. BARTRAM, EDWIN B. Mosses of Interior British Guiana. Bull. Torrey Bot. Club 66(4): 221-230. 1939.—Lists 48 spp. collected by A. C. Smith in central and southern British Guiana of which 17 spp. range north to Florida. Includes n. spp. in Calymperes and Rhaphidostichum.—E. B. Bartram.

8418. BLOMQUIST, H. L. Notes on southern Hepaticae. Bryologist 42(2): 29-32. 1939.—A list, with detailed annotations, of 9 spp., of which Blasia pusilla and Lophozia bar-

bata are first recorded from N. Carolina, Riccia donnellii and Grimaldia fragrans are new to Georgia, and Fossombronia wondraczeki, Telaranea nematodes var. longifolia and Petalophyllum ralfsii are new to Mississippi.—W. C. Steere.

8419. PAGÁN, F. M. A preliminary list of the Hepaticae of Puerto Rico including Vieques and Mona Island (continued). Bryologist 42(2): 37-50. 1939.—Three spp. of Mastigobryum are transferred to Bazzania.—W. C. Steere.

PTERIDOPHYTA

C. A. WEATHERBY, Editor

(See also in this issue Entry 8372)

8420. BROOKS, M. G. (With illustrations by A. S. MARGOLIN.) The pteridophytes of West Virginia. W. Virginia Univ. Bull. 39(2): 1-60. Frontispiece, 16 pl. 1938.

8421. COPELAND, E. B. Ferns of southeastern Polynesia. Bernice P. Bishop Mus. Occas. Papers 14(5): 45-76. 25 pl. 1938.—There are two original elements in the Polynesian fern flora, an Austral (the older) and a Malay-Papuan. Both came into the region here treated (the Society Islands and islands to the south and southeast of them) from the west. From them a small group of species widely spread in Polynesia but peculiar to it have developed; these are mainly of Austral affinity. Three new records from the Society Islands and a list based on 629 collections by St. John and Fosberg are given. New species are proposed in Angiopteris, Mecodium, Callistopteris, Macroglena, Cyathea, Dryopteris (2), Polystichum (2), Athyrium (5), Blechnum, Asplenium, Lindsaea, Adiantum, Hymenolepis (2), Elaphoglossum, Grammitis (2), Calymmodon, and Microsorium. The names Sphenomeris and Campium are maintained against Christensen's Stenoloma and Bolbitis.—C. A. Weatherby.

and Bolbitis.—C. A. Weatherby.
8422. FLORSCHÜTZ, F. Die beiden Azolla-Arten des niederländischen Pleistozäns. Rec. Trav. Bot. Néerland. 35 (1): 932-945. 2 maps, 3 pl. 1938.—Characters and distribu-

tion in the Netherlands of A. filiculoides and A. tegeliensis are given, with notes on occurrence of fossil Azollas elsewhere.—E. E. Cheesman.

8423. GILLILAND, H. B. The vegetation of Rhodesian Manicaland. Notes on the flora of Rhodesian Manicaland. I. Jour. S. African Bot. 4(3): 73-99. 24 pl., 4 fig.; (4): 143-156. 5 pl. 1938.—The author continues his studies of the eastern border of Rhodesia and deals here with the Bryophyta (in collaboration with W. R. SHERRIN); the Pteridophyta (in collaboration with A. H. G. ALSTON) and the gymnosperms Sphagnum angolense, S. ericetorum, Hymenophyllum kuhnii, Cyathea deckenii, Nephrolepis undulata, Asplenium hypomelas, A. linearilobum, Elaphoglossum isabelense, Lycopodium ophioglossoides and Selaginella abyssinica are recorded south of the Zambesi for the first time. Alston makes the new comb. Dryopteris prolixa (Willd.) O. Ktze. var. bergiana (Schl.) Alston. Encephalartos gratus var. manikensis was found—the first record of a cyad from Southern Rhodesia.—H. B. Gilliland.

8424. LID, JOHANNES. Dryopteris austriaca var. Willeana n. var. Nytt Mag. Naturvidensk. 77: 102-104. 1 fig. 1937(rec'd 2-28-39).—From Norway; recognizable by its brown-black rachis.—G. J. Anderson.

SPERMATOPHYTA

FRANCIS W. PENNELL, Editor

(See also in this issue Entries 7071, 7089, 7192, 7204, 7209, 7219, 8509, 8530, 8533, 8538, 8541, 8595)

GYMNOSPERMAE

8425. KRAUSE, K. Zur Abstammung des Zwergwacholders. Ber. Deutsch. Bot. Ges. 56(6): 192-196. 1938.— The supposition that the Mediterranean form of Juniperus nana (dwarf juniper) may be derived from either J. communis or J. oxycedrus is criticized. On the basis of the distribution of these forms the author believes that J. nana can be derived only from J. oxycedrus.—H. C. Beeskow.

ANGIOSPERMAE (MIXED)

8426. OHWI, JISABURO. Symbolae ad floram Asiae orientalis. 17. [In Eng. & Jap.] Acta Phytotax. et Geobot. 7(3): 129-138. 1938.—Descriptions of new spp. from Japan, Formosa, Korea and China, in Setaria, Polygonum, Carex, Poa, Sciaphila, Cheirostylis, Scirpus, Deutzia, Zanthoxylum, Adinandra and Cyperus.—E. H. Walker.

MONOCOTYLEDONES

8427. BOR, N. L. A list of the grasses of Assam. Indian Forest Rec. (B) 1(3): 47-102. 5 pl. 1938.—This list of the grasses so far known to inhabit Assam includes n. spp. in Sclerostachya, Themeda, Rottboellia, Deyeuxia, Ischaemum, and Hyparrhenia (1 sp. in each), and new combs. in Helictotrichon, Arundinella, Acroceras, Microstegium, Cymbopogon (2), and Schizachyrium. The modern names of the species are given, together with the synonym

as it appears in Hooker's Flora of British India.—Auth. abst.

8428. GUILLAUMIN, A. Materiaux pour la flore de la Nouvelle Calédonie. L. Revision des Cypéracées. Bull. Soc. Bot. France 85(1/2): 37-47. 1938.—Keys are given for the 21 genera and 69 spp. of Cyperaceae found in New Caledonia, including Lepidosperma perplanum and Cladrum (Mariscus) ouveanum. 13 of the 16 endemic spp. belong to the Rhynochosporoideae.—E. L. Core.

8429. WAGENAAR HUMMELINCK, P. Notes on Agave in the Netherlands West Indies and North Venezuela. Rec. Trav. Bot. Néerland. 35(1): 14-28. 4 pl. 1938.—Seven spp. (none new) are desc. and annotated.—E. E. Cheesman.

DICOTYLEDONES

8430. AST, S. Identité de deux espèces d'Anonacées: Oxymitra gabriaciana Baillon et Goniothalamus saigonensis Pierre mss. ex Finet et Gagnepain. Espèces nouvelles d'Indo-Chine. Bull. Soc. Bot. France 85(1/2): 50-53. 1938.— The correct name is Goniothalamus gabriciana. Descriptions are given of other Annamese spp. of Goniothalamus.— E. L. Core.

8431. BAKHUIZEN van den BRINK, R. C. Revisio Ebenacearum Malayensium. Bull. Jard. Bot. [Buitenzorg] 15(3): 177-368. 1938.—Continuation of a revision of Malayan Ebenaceae. 94 spp. of Diospyros are discussed. 2 spp., 3 vars., and 2 new combinations are published.—R. T. Clausen.

8432. BENOIST, R. Nouvelles espèces du genre Salpichroa (Solanacees). Bull. Soc. Bot. France 85(1/2): 53-56. 1938.—7 spp. are descr. from Ecuador, Peru, and

Bolivia.—E. L. Core.

8433. DEHAY, CH. Les affinités entre les Euphorbiales, les Morales et les Malvales, d'après l'appareil libéro-ligneux foliaire. Bull. Soc. Bot. France 85(1/2): 23-31, 2 fig. 1938. —Apropos of the recent publication of the English workers (Burtt Davy and Dr. Chalk) who make use of vascular anatomy to determine the major lines of classification, the author shows that the comparative anatomy of the foliar fibro-vascular apparatus furnishes equally good characters which, in the case studied, make possible the alignment of the Euphorbiales with the Morales and, by the intermediary Sterculiaceae, with the Malvales. Each of these orders seems to have developed along parallel lines.—P. D. Strausbaugh.

8434. GUILLAUMIN, A. Matériaux pour la flore de la Nouvelle Calédonie. XLVIII. Révision des Simarubacées. XLIX. Clef de Detérmination des Burséracées. Bull. Soc. Bot. France 85(1/2): 19-21. 1938.—Keys are given for the 2 genera and 7 spp. of Simarubaceae and for the 2 genera and 4 spp. of Burseraceae found in New Caledonia.—E. L.

Core

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JONES, GEORGE NEVILLE. A synopsis of the North American species of Sorbus. Jour. Arnold Arboretum 20: 1-43. 2 pl. 1939.—Taxonomic revision treating 11 spp. and 1 var. in N. America and Greenland. Key, descriptions, full bibliography, extensive citation of specimens, and discussions of hybrids. One new species (S. alaskana) from cussions of hybrids. One new species (S. alaskala) from Alaska, and 2 nomenclatural transfers—one in Sorbus, one in X Sorbaronia—are published.—G. N. Jones.

8436. LOTT, HENRY J. Nomenclatural notes on Hyperi-

cum. Jour. Arnold Arboretum 19(3): 277-278. 1938.—A new combination and new synonyms of the North American flora are proposed.—A. Rehder.

8437. PELLEGRIN, FR. Plantae Letestuanae novae (XXV). Bull. Soc. Bot. France 85(1/2): 56-58. 1938.—Decriptions are given for the following species of African plants collected by Le Testu: Ixora le testui, Gardenia tchibangensis, and Tricalysia lecomteana.—E. L. Core.

8438. SKOTTSBERG, CARL. Ericaceae and Santalaceae

of southeastern Polynesia. Bernice P. Bishop Mus. Occas. Papers 14(4): 31-43. 5 fig. 1938.—Records 4 spp. including Executive psilotiformis*.—E. H. Bryan, Jr.

8439. SMITH, A. C. Studies of South American plants
—VI. Preliminary notes on Hippocrateaceae. Bull. Torrey
Bot. Club 66(4): 231-249. 1939.—A key to the 35 known

Amazonian spp. of Salacia, followed by short geographic notes and descriptions of the 17 new spp.-A. C. Smith.

8440. WAGENAAR HUMMELINCK, P. Notes on the Cactaceae of Curaçao, Aruba, Bonaire and North Venezuela. Rec. Trav. Bot. Néerland. 35(1): 29-55. Map, 8 pl. 1938. Notes on 27 spp. (including cultivated) with distribution table and key—E. E. Cheesman.

FLORISTICS AND PLANT DISTRIBUTION

8441. CÉZARD, N. Notes pour la flore lorraine. Quelques plantes récoltées en 1937. Bull. Mens. Soc. Sci. Nancy 3(6/7): 135-140, 1938.—An account of spp. encountered on

field trips.-W. C. Tobie.

8442. JONES, GEORGE NEVILLE. The flowering plants and ferns of Mount Rainier. Univ. Washington Publ. Biol. 7: 1-192, 9 pl. 1938.—A descriptive flora with keys and descriptions of 71 families, 300 genera, 729 spp. New names or combs. occur in Equisetum, Erythronium, Eriogonum, Rosa, Sorbus, Astragalus, Epilobium, Hydrophyllum, Phacelia, Valeriana, and Gnaphalium. A brief summary of vegetation and flora according to life-zones and life-forms

is given.—G. N. Jones.

8443. McKAY, MRS. H. M. Burchell's index to the aboriginal African and Dutch names of the plants of Southern Africa. Jour. S. African Bot. 4(4): 129-141. 1 pl. 1938.—The Index has reference to the Plantarum Africae from 1810 till 1815, and indicates what he considered indigenous plants which he found in the course of his travels. To the 4 columns in the original MSS, has been added one giving the localities in which Burchell found his plants; the names of the present day (1938) districts have been added. A sketch by Burchell of Calodendron capense (Plate 40), mentioned in "Travels," Vol. I, p.63, is reproduced.—Mrs. H. M. McKay.

8444. RECHINGER, K. H. Zur Flora von Ostmazedonien und Westthrazien. Bot. Jahrb. 69(4): 419-552. 3 pl. 1939.—A list of plants collected by the writer in eastern Macedonia A list of plants confected by the writer in eastern Macedonia and western Thrace, together with discussion of the soils, geology, and climate of the region and complete bibliography; 77 new spp., subspp., vars., forms, and hybrids are descr. and 2 new combs. are made, in the genera Quercus, Rumex, Rubus, Potentilla, Verbascum, Thymus, Cerastium, Ministration Constitutes Constitutes Constitutes and the second constitutes are second constitutes and the second constitutes and the second constitutes are second constitutes are second constitutes and the second constitutes are second constitutes and second constitutes are second constitutes are Hieracium, Knautia, Onopordon, Crupina, Dianthus, Alyssum, Asperula, Galium, Festuca, Turritis, Hypericum, Goniolimon, Sideritis, Lactuca, Dorycnium, and Salvia.-H. N.

Moldenke.

MORPHOLOGY AND ANATOMY OF VASCULAR PLANTS

(See also in this issue Entries 7104, 7109, 8369, 8433, 8536, 8538)

8445. BAILEY, I. W. The microfibrillar and microcapillary structure of the cell wall. Bull. Torrey Bot. Club 66(4): 201-213. 11 fig. 1939.—The cellulosic matrix of the cell walls of the higher plants appears to be a continuous system. Physical and chem. data suggest that it is composed, in the submicroscopic field, of aggregations of chainmolecules that are held together by overlapping chain-molecules. In the microscopically visible field it is con-stituted of coalesced microfibrils. In both fields of magnitude, the continuous cellulosic system is perforated by a continuous system of interconnecting capillary spaces. Although the cellulosic matrix is a continuous system, it may be dissected into fragments of varying shapes and sizes by drastic mechanical and chem. treatments.—I. W. Bailey.

8446. BORNAND, G. H. Un cas d'imprégnation par la résine du bois d'un pin noir d'Autriche (Pinus laricio var. austriaca). Jour. Forest. Suisse 90(3): 45-49. 3 fig. 1939 .-Microscopic examination of a resin-saturated piece of Austrian pine wood revealed that the resin apparently had originated in the resin ducts of the cambium zone, and that pressure caused by excessive resin secretion had forced it inward along the medullary rays and through the pitted walls into adjoining tracheids.—W. N. Sparhawk.

8447. FREY-WYSSLING, ALB. Über die submikro-

skopische Morphologie der Zellwände. Ber. Deutsch. Bot. Ges. 55(Generalversammlungs-Heft): 119-132. 1937.—The reticular structure of cell walls is discussed. Cellulose is

composed of long molecules which are aggregated into contiguous crystalline bundles or micellae. The micellar lattice has a continuous intermicellar structure. Roentgenometrical measurements of these intermicellar spaces are given. The system is heterocapillary. The morphology of submicroscopic intussusception with waxes is described and the mechanism of cell wall stretching is discussed .-H. C. Beeskow.

8448. GARLAND, H. A microscopic study of coniferous wood in relation to its strength properties. Ann. Missouri Bot. Gard. 26(1): 1-94. 8 pl. 1939.—Samples of wood of Pinus taeda and Pinus echinata were subjected to standard series of engineering strength tests, then the fractures and isolated fibers were examined microscopically. The principal factors affecting strength are observed to be proportion of springwood to summerwood, proportion of outer layer to central layer of the secondary wall by sectional area, variation of angle of slip lines and frequency of fibrillar checks, number of wood rays per unit of tangential area, and degree of compression damage previously sustained as seen by the occurrence of slip lines. The observations correlate well with previous theories concerning the fibrillar nature of the cell wall of fibers. In most cases the area of maximum weakness in the lignified wall is between the outer and central layers of the secondary wall, rather than in the middle lamella.—F. R. Fosberg.

*8449. HANDA, TSUGIO. Anomalous secondary growth in the axis of Bauhinia championi Benth. Jap. Jour. Bot. 19(3): 303-311. 1 pl., 2 fig. 1938.—Two types of anomalous secondary growth are descr.: (1) the vascular ring is divided into several segments and secondary bundles are formed, cambial activity in the segments and secondary bundles eventually giving rise to a cleft xylem-mass; (2)

secondary meristems originating in pericyclic parenchyma produce rings of wood and bast.—P. D. Strausbaugh.

8450. JOSHI, A. C. The nature of the ovular stalk in Polygonaceae and some related families. *Ann. Botany* 2(8): 957-959. 2 fig. 1938.

957-959. 2 fig. 1938. 8451. THRUPP, T. C. An impregnation method for staining starch grains. Ann. Botany 2(8): 959-960. 1938.

AGRONOMY

Editor: CARLETON R. BALL. Associate Editors: M. A. McCALL, Crops; R. B. DEEMER, Soils (See also in this issue Entries 7071, 7084, 7129, 7130, 7131, 7132, 7133, 7171, 7175, 7178, 7181, 8066, 8331, 8333, 8343, 8352, 8516, 8526, 8567, 8572, 8585, 8586, 8595, 8627)

CROP SCIENCE (ARVICULTURE)

8452. ÅKERMAN, Å. Die Möglichkeit, die Qualität unserer Getreidearten durch Züchtung und Stickstoffdüngung zu verbessern. Zeitschr. Zücht. Reihe A. Pflanzenzücht. 22(4): 551-563. 2 fig. 1938.—New vars. of spring wheat, such as Diamant II, indicate that good quality has been introduced without sacrifice of yield. Quality improvement will be extended to winter vars. where marked advances have already been made. Expts. near Malmöhus have shown an average increase in yield per ha. of 450 kg. of winter wheat for the 1st 100 kg. of KNO₃ application while the use of 200 kg. increased the yield 750 kg. The protein content of the grain was increased 0.3% by the full application but not increased by 100 kg. of fertilizer. The fertilizer early in June increased the grain protein 0.9%; application early in April resulted in only 0.4% increase in protein, yields in the 2 cases being the same. N fertilizers have relatively greater influence with spring wheats with respect to protein content of the grain and contrarily with respect to yield. In Gotland successive increases of KNO₃ applications resulted in increasingly higher contents of protein in the grain and the corresponding bread volumes were consecutively 8, 12, 15 and 18% larger than the loaves baked from the unmanured series of plats. Increased manuring ordinarily does not affect either kernel or test weight, especially with the strong-strawed sorts. Attention should be paid to production of vars, with a slow maturing grain to prevent germination in the shock.—L. R. Waldron.

8453. APAOAN, ANACLETO L. A study of the growth of rice plants. II. Effect of shading on can grown plants. Philippine Agric. 27(10): 818-843. 5 fig. 1939.—Shading greatly retards attainment of the "critical stage" in tiller formation. Plants grown in direct sunlight produced more tillers than those grown in the shade, hence more bearing culms. Plants grown in the open were shorter and had narrower leaves but produced more and heavier grains which germinated earlier than those obtained from plants

narrower leaves but produced more and heavier grains which germinated earlier than those obtained from plants grown under shade.—M. Manresa.

8454. BENNETT, M. K. Trends of yield in major wheat regions since 1885. I. General considerations and rising trends. II. Irregular, stable and declining trends. Wheat Studies [California] 24(3): 69-102. 1937; (6): 223-261. 1938.—The 2 parts of this study comprise a fairly comprehensive survey of trends of average yield per acre in most regions of the world excluding Soviet Russia, China, Turkey, and neighboring Asiatic countries. The objectives are to describe trends of yield, based on weighted 9-year moving averages of annual yields per acre, in 14 wheat-growing areas and to suggest explanations of the strikingly different characteristics of the trends in these regions. As affecting the slope and conformation of yield trend, 6 types of influences are distinguished: inaccuracies in basic statistics; geographical shifts of wheat acreage within the region; the initial level of yield per acre; changes in types and vars. of wheat; changes in the environment of the wheat plant due to natural causes (pests, weather); and man-made changes in this environment, chiefly disease controls, rotations, fertilizers, mechanical devices, and regulation of water supply. For the 14 regions considered together the trend of yield was upward in the 1st part of the past 50 yrs. and downward in the 2d part. This downward drift of "world" average yield may or may not persist, depending upon the interaction of opposing influences whose relative effects cannot be confidently forecast .- S. Hoos.

8455. BLAIR, W. S., and J. S. LEEFE. Influence of lime in crop rotation with a note on the occurrence of boron deficiency in mangels. Sci. Agric. [Ottawa] 19(5): 330-343. 1939.—24 years' work with a 3-year rotation using 2 sources of N and 3 of P on limed and unlimed soils is reported. 4 applications of limestone made in the early years were found to be the greatest single factor influencing crop yields. The source of N was found to be of some importance with the mangel and clover crops, where NaNO₃ was superior to (NH₄)₂SO₄. For grain on limed soil and for potatoes the 2 sources of N were about equal. The effects of the P sources are somewhat variable but generally bonemeal was not as satisfactory as slag or superphosphate. Slag and superphosphate gave about equal results. The soil in the expt. was found to be deficient in B for mangels. This crop responded well to a small application of borax.—J. S. Leefe.

tion of borax.—J. S. Leefe.

8456. BOLIN, D. W. Stability of carotene in green grasses and alfalfa stored at five degrees Fahrenheit. Jour. Dairy Sci. 22(2): 111-113. 1939.—Green alfalfa (Medicago sativa) lost better than 60% of its original carotene content when stored for 10 mos. at 5° F. Grasses, including Kentucky blue (Poa pratensis), orchard grass (Dactylis glomerata), meadow fescue (Festuca elatior), and brome (Bromus inermis), lost little or no carotene when stored under similar conditions.—D. W. Bolin.

8457. CALÒ, A., e C. TOFFOLI. Analisi di semole e paste alimentari di produzione Italiana. [Analysis of grains and their food products of Italy.] Ist. Sanità Pubblica Rend. [Rome] 1(2): 597-608. 1938.

8458. CITTADINI, ANGELO. Studio sul sorgo zuccherino. Estrazione della cellulosa col processo Pomilio e ricupero delle sostanze zuccherine. [Sorghum saccharatum. Extraction of cellulose by the Pomilio process, with recovery of the sugars.] Chim. e Indust. 20(12): 785-790. 1938.—The sorghum showed the following analysis: water, 59.57%; mineral matter, 3.87%; water soluble substances, 32.86%; substances soluble in 1% NaOH, 27.91%; lignin, 3.09%; cellulose, 36.52%.—F. A. McDermott.

8459. CLEARE, L. D. A water rat (Hoplochilus sciureus berbericensis Morrison-Scott) damaging sugar-cane in British Guiana. Agric. Jour. Br. Guiana 9(4): 217-229.
3 pl. 1938.—Serious damage was done to fields of sugar-cane adjoining a savannah in which this rat normally breeds. Its natural food consists of the grasses Hymenachne amplexicaulis, Paspalum virgatum, Panicum laxum, and other savannah grasses. In the laboratory rats were kept on Panicum maximum, sugar-cane, and rice shoots. They feed on the lower joints of the sugar-cane, often causing the stalk to break, and also attack the young shoots. Preferred varieties were Diamond 10, Co 213, D 927/22 and D 74/30. Although the rats migrated into the cane from the savannah, probably due to unfavorable conditions, such as too heavy flooding, they advanced into the cane some distance from the savannahs as the season progressed. The principal enemy of the rat is the bot, Cuterebra apicalis, but secondary infection following the emergence of the bot larvae by blow flies, Cochliomyia, is often found. On three estates in 26 months a total of over 437,000 rats was caught by men with hunting dogs. The most successful poisoning was obtained by treating shoots of padi (rice) with Na arsenite in aqueous soln., or with thallium sulphate.—W. D. Pierce.

8460. DEXTER, S. T., and D. L. CLANAHAN. Early

cutting and fertilization of quack grass meadows. Quart. Bull. Michigan Agric. Exp. Sta. 21(3): 176-179. 1939.— Yields of quack grass meadows in northern Michigan were only about 1 larger, measured in terms of weight, when cut late (early July) than when cut early (mid-June). Late cutting reduced the protein content of the hay from an average of 9% to an average of 6%, lowered substantially the % of total digestible nutrients and increased the percentage of crude fiber. Fertilizing with 200 lbs. of (NH₄)₂SO₄ to the acre resulted in doubling yields, from an average of about \(\frac{3}{4}\) ton to an average of \(\frac{1}{2}\) tons, and in increasing the yield of protein by about 150 lbs. per acre.—

8461. GAYWALA, P. M. The cultivation of Cajanus cajan and the methods of preparing marketable dhal. *Trop. Agric.* [Ceylon] 90(4): 212-221. 1938.—Some of the varieties grown in India can be cultivated for seed production in dry zones of Ceylon. The requisite number of dry sunny days are available in the dry zone for the preparation of dhal, which has a considerable local consumption in Ceylon.

8462. HAIGH, J. C. Studies on paddy cultivation. 8. The effect of spacing and method of planting on yield. Trop. Agric. [Ceylon] 91(2): 71-102. 1938.—Trials of transplanting paddy (rice) at 4 different spacings, and using 2 methods of planting. The spacing of 4 in. by 4 in. is near the optimum for long-aged paddies under field conditions. At that spacing, there appears to be little advantage to be gained by planting 3 seedlings to a hill, although at wider spacings there is definite advantage. The most important determiner of acre yield is spacing, which overshadows individual plant performance, so that a bigger crop is produced from a large number of small plants than from a small number of large ones. Yield per plant (y) and number of plants per unit area (x) appear to be related by an expression of the form $y=ax^b+c$, where a, b and c are constants, and b is <0>-1.-W. D. Pierce.

8463. HAWKINS, R. S. Relation between fiber length and maturity in cotton. Law. Acric. Res. 57(8): 583-587.

and maturity in cotton. Jour. Agric. Res. 57(8): 583-587. 1 fig. 1938.—Analysis of representative seed cotton samples from several fields proves that, irrespective of plant types, the fibers of intermediate lengths are more mature than the longest or the shortest fibers in a given lot of cotton.—R. S.

Hawkins.

8464. HENSON, EDWIN R. Curing and storage of alfalfa hay. Iowa Agric. Exp. Sta. Res. Bull. 251. 1-46. 1939.— This publication reports hay curing studies during 1927-1929, inclusive, and storage studies for 1928-1930, inclusive. A comprehensive review of the literature bearing on the problems is also included. Attention is given to the hour of cutting, function of the leaves, including stomatal behavior, and methods of handling the hay in the field, as influencing the rapidity of curing and the quality of the crop. The storage studies have to do with the influence of the moisture content when the hay is placed in the mow, or baled from the field, on heating and the resulting dis-coloration; also the influence of salt when used in different amts. on the heating of the forage. The hour at which the forage is cut, as influencing the moisture content of the material, is not an important consideration in hastening the field curing process. Use of the tedder on the hay when in the swath, or turning average sized windrows with the rake, as a means of hastening the curing, impairs the quality of the product. Good quality hay is best obtained by curing in the windrow after ½ swath curing. Hay put in the mow with below 30% of moisture was considered safe from excessive heating and when the moisture was as low as 25% the hay remained green. The degree of heating is not directly proportional to moisture content when placed in storage. Green color was usually destroyed when heating exceeded 50° C. Clean brown hay was formed at temps. above 55° C and below 70° C. In general moldy hay resulted when the hay was heated to between 40° and 50° C during the storage period. The value of salting hay in the mow was tested 8 times with beneficial effects twice and apparently no benefit in 6 trials. When hay baled from the field with 23% of moisture was carefully stored there was no detrimental heating. A method for determining, with a considerable degree of accuracy, the moisture content of hay at different curing stages is described.—C. P. Wilsie.

8465. HILTON, S. A., and C. D. T. CAMERON. Renovation of old meadows without reseeding. Sci. Agric. [Ottawa] 19(5): 322-329, 1939,—15 fertilizer treatments, applied to medium clay loam sod land, were compared over a 7-year period. Soil analyses, by rapid test methods, indicated that this area was moderately acid and very deficient in P and K. Differences noted in samples taken in different months suggest interpreting soil analyses to the farmer in the light of a possible relationship between season and availability of plant food. In this expt., N was applied in 3 forms: (N) NaNO₃; (SA) (NH₄)₂SO₄; (NC) nitrochalk; (P) as 16% superphosphate; (K) as 50% KCl; (L) as ground calcitic limestone. All treatments containing P, alone or in combination, gave significant and economical increases. Other treatments applied were not economical, although when SA alone and K, when combined with L, were applied, yields were increased to the point of significance. L alone (at 2 tons per acre) tended to depress yields immediately after application. Botanical surveys indicated marked changes in the flora, undesirable species tending to decrease with applications of P, and, to a greater extent, when N, P, and K were applied in combination—S. A. Hilton.

8466. HOPKINS, J. W. Influence of air temperature and soil moisture subsequent to flowering on the nitrogen content of wheat. Canadian Jour. Res. Sec. C, Bot. Sci. 15(3): 135-142. 1938.—Marquis wheat plants were grown in soil in the greenhouse under uniform conditions until the flowering stage, when 6 differential treatments, viz., 15, 20 or 25% soil moisture in combination with a diurnal air temp. cycle of 45-70° or 55-80° F, were imposed. The effect of the higher air temp. in increasing N content through accelerated respiration was evident in grain collected when in the early dough stage (about 50% dry matter). By the late dough stage there were also significant differences attributable to soil moisture under both temp. régimes. However, the N content of the completely ripe grain was practically the same for all 6 treatments. This is attributed to a retardation of maturity by both increased soil moisture and lower air temp., which would permit additional dissipation of carbohydrate through prolonged respiration, and also possibly to differences in the extent of tillering. Compensatory effects of this magnitude would hardly be expected under field conditions, but might occur on a reduced scale, thus increasing the difficulty of correlating N content with meteorological observations.—Auth. abst.

8467. KEARNS, VIVIAN, and E. H. TOOLE. Temperature and other factors affecting the germination of fescue seed. U.S. Dept. Agric. Tech. Bull. 638. 1-35. 1939 .- A study was made of the relation of temp., age of seed after harvest, use of dilute KNO2 soln., exclusion of light, and the storage temp. of the seed on the germination of seed of Festuca rubra var. commutata, certain mixed commercial strains of F. rubra, a strain of F. rubra known commercially as creeping red fescue, F. capillata, F. elatior, and F. e. var. arundinacea, harvested at different stages of maturity in 3 years. Temps. used were 10°, 15°, 20°, 25°, and 30°C, and alternating temps. including various combinations of the above. Fescue seed placed to germinate immediately after harvest and especially that collected when immature required a low temp. for germination. With fresh seed, the optimum temp. for germination was 10° for F. rubra strains; 15° to 25° daily alternation for F. rubra var. commutata, creeping red fescue, and F. elatior var. arundinacea; 10° to 25° for F. capillata; and 15°, 20°, or 15° to 25° for F. elatior. As the seed aged it germinated over a wider range of temps. Fresh seed of F. capillata, F. elatior var. arundinacea and creeping red fescue germinated poorly at all constant temps. Seed of all spp., when pre-chilled at 5° for 7 days, showed increased germination at temps, ordinarily too high for complete germination of fresh seed. Seed of *F. elatior* var. arundinacea and *F. capillata* kept in dry storage at low temps, responded to high germination temps. comparably with fresh seed. F. capillata was the only species that responded to the use of light and KNOs at an opt. temp.; other spp. responded only at temps. unfavorable for complete germination. Maximum germination was completed in 14 days for F. elatior, in 28 days for F. capillata and in 21 days for the other spp. tested.—Authors.

8468. LARSON, H. W. E., and J. MITCHELL. The nitrate and moisture content of soil under various crops and treatments at Saskatoon, Saskatchewan. Sci. Agric. [Ottawa] 19(5): 279-290. 1939.—A 5-year study of the nitrate and moisture content of plots under a rotation of summer fallow, wheat, corn, oats and sweet clover, and of summer fallow, wheat, oats vs. continuous wheat is reported. In the 5-year rotation the effect of adding straw, manure, manure plus superphosphate, and superphosphate alone also was studied. Accumulation of nitrates occurred most rapidly between the middle of June and middle of Aug. of the summer fallow year, reaching an average figure of 38.8 p.p.m. by the end of the season. Rapid disappearance of nitrates coincided with the period of most rapid growth of the wheat crop. The nitrate N content reached its lowest level under sweet clover. Corn appeared to allow somewhat higher levels of nitrates than other crops. Farm manure produced a slight increase in nitrate content of the soil in the summer fallow year. A light application of straw slightly reduced the amount of nitrates accumulated in the same period. In periods of heavier precipitation there is some leaching of nitrates to lower horizons of the profile, but not beyond the reach of plant roots.—J. Mitchell.

8469. MARSTON, A. R. Measuring hybrid corns for Michigan. Quart. Bull. Michigan Agric. Exp. Sta. 21(3): 151-160, 3 fig. 1939.

8470. MIEGE, E. Étude du développement du système radiculaire du blé. (cont.) Rev. Bot. Appl. 18(201): 313-290 1038

8471. MOORE, H. C., and E. J. WHEELER. The Pontiac potato. Quart. Bull. Michigan Agric. Exp. Sta. 21(3): 174-175. 1939.

8472. ROGERS, T. H., and D. G. STURKIE. Effect of fertilizers and method of their application on nodulation, growth, and nitrogen content of hairy vetch. Jour. Amer. Soc. Agron. 31(2): 141-148. 2 fig. 1939.—Hairy vetch (Vicia villosa) was grown in quadruplicate plots on a light, Norfolk sandy soil on which vetch had never been grown. Every 4th plot served as a check. All plots were planted by hand Sept. 23, 1936. One half were seeded with the fertilizer in contact with the seed; on the other half the fertilizer was mixed with the soil before the seed was planted. Basic slag did not reduce the number of nodules or growth of the plants when applied in contact with the inoculated seed. Superphosphate and triple superphosphate produced 20% less growth when the inoculated seeds were planted in contact with the fertilizer than when the fertilizer was mixed with the soil prior to planting. Mixing dolomite with superphosphate partially reduced this injury. Superphosphate when applied in contact with the inoculated seed was much more injurious to the soil inoculation than to the commercial inoculation. The percentage of N in the plants was increased by applications of fertilizer or by inoculation. The method of applying fertilizers did not affect the percentage of N in the plants.—T. H. Rogers.

8473. SMITH, O. Growth and development of the potato as influenced especially by soil reaction. Mem. [New York] Cornell Agric. Exp. Sta. 215. 1-46. 17 fig. 1938.— The typical sigmoid curve for rate of growth was obtained. Respiratory activity was greatest in the early harvested, less mature tubers, and decreased gradually as maturity advanced. Dry-matter and starch contents of tubers of representative sizes grown at various soil reactions were detd. in 1932 and 1933. The dry matter % in tubers larger than 50 g., grown at intermediate reactions from pH 5.64 to 6.05, tended to exceed that in tubers grown at higher or lower soil reactions. Size of tubers above 1 g. was not related to percentage of dry matter at any one harvest date or range of reaction. In tubers of like size, dry weight % was higher at pH 7.95-8.27 than at pH 4.84-5.34. Tubers weighing less than 50 g., in general, had lower percentages of starch on the dry-weight basis than larger tubers, which usually had the highest starch content at the last harvest. In general, the starch % in tubers grown at reactions pH 5.4-6.05 exceeded that in tubers grown at higher or lower pH ranges. Tubers weighing less than 1 g. had the lowest starch percentage at all reactions and harvests.—(Courtesy Exp. Sta. Rec.).

8474. THOMSON, J. R. The development of sainfoin in its seeding year. Ann. Appl. Biol. 25(3): 457-470. 2 pl. 1938.—The mode of germination of milled and unmilled seed and the development of the seedlings are described and the development of the seedlings are described and tends to produce more leaflets per leaf than Common Sainfoin in the first 6 leaves. Genuine Common Sainfoin produces short tillers, retains its rosette habit and does not flower. Giant Sainfoin produces fewer tillers and these tend to elongate and bear flowers. In each var. considerable variability is shown as between individual seedlings and the amt. of overlap suggests that both vars. were derived from the same original stock by selection. From what is known of the vars. it is suggested that the selective factor separating them is the age of the plants when seed is taken, seed being harvested from Giant early and from Common late in the ley.—J. R. Thomson.

8475. WERTH, E. Neues zur Geographie und Geschichte der Getreidearten. Ber. Deutsch. Bot. Ges. 56(9): 425-435. 1938.—The migration of types of agriculture and the use of various cereals in prehistoric Europe are discussed. In the early stone age agriculture was restricted to the use of barley and emmer which was introduced into western Europe and the Baltic region from the Mediterranean. In the Neolithic age a 2d movement of agriculture came into Europe from the south-east and brought with it Einkorn and dwarf wheat. Tropical millets (Andropogon, Pennisetum, Eleusine) came into Europe via India, Arabia, and Egypt. These millets were also introduced into eastern Asia via Turkestan. The migration and establishment of rice culture are discussed. During the bronze age the culture of oats replaced that of millet in north central Europe. Oats were introduced as weeds in millet. During this period (Lake Dwellers) spelt was introduced into south-eastern Europe. Rye came into central Europe from Asia at this time. The use of various agricultural implements and of draft animals in agriculture in prehistoric times is discussed.—H. C. Beeskow.

8476. WHEELER, E. J. A quick method of predetermining the culinary quality of potatoes, with special reference to color. Quart. Bull. Michigan Agric. Exp. Sta. 21(3): 213-215. 1 fig. 1939.—Cooking tests with a large number of potato vars. and of seedlings grown under different conditions indicated a close correlation between color, texture and flavor. Potatoes that cooked white were usually mealy in texture and of good flavor; those that discolored were often soggy and of poor flavor. Tests showed that plugs cut from the fresh tubers and placed immediately in 95% ethyl alcohol quickly showed the same color changes that the same tubers developed upon cooking and that they retained these colors indefinitely if left in the alcohol.—V. R. Gardner.

8477. WRIGHT, R. C. Bruising, freezing, and chemical injury of potatoes in transit. U. S. Dept. Agric. Tech. Bull. 668. 1-22. 12 fig. 1938.—The bruising of potatoes next to the floors in railroad cars is often mistakenly attributed to chemical injury or freezing injury, since these 3 forms of injury have certain similar characteristics. Laboratory and simulated transit tests showed that chemical injury occurred only when the skins of potatoes were broken when in contact with soluble chemicals, thus indicating that chemical injury was secondary to mechanical injury. Freezing injury usually occurred independently of bruising injury.—R. C. Wright.

SOIL SCIENCE (EDAPHOLOGY)

8478. ATKINSON, H. J. Soil solution studies. Sci. Agric. [Ottawa] 19(4): 233-235. 1938.—Critical discussion of the studies, and of the results obtained by them.—H. J. Atkinson

8479. CALDWELL, A. C., F. A. WYATT, and J. D. NEWTON. Effects of cultivation and cropping on the chemical composition of some western Canada prairie soils. Sci. Agric. [Ottawa] 19(5): 258-270. 1939.—34 cultivated fields and the corresponding virgin soils scattered throughout Alberta and Saskatchewan were analyzed. 26 of the cultivated fields have lost N in amounts varying from 96 to 7,128 pounds per acre, and 29 of the cultivated fields have lost organic matter in amts. varying from about 1 ton to

over 78 tons per acre in the depths analyzed. The surface over 75 tons per acre in the depths analyzed. The surface 6 inches of cultivated black, dark brown, brown and gray soils have lost 18%, 22%, 20% and 35% of the original N content, and 21%, 26%, 27% and 42% of the original organic matter content. Cultivation has resulted in a narrower C:N ratio in the surface horizons of 27 out of 34 cultivation and contents. cultivated fields, and in the subsurface of 22 out of 33 fields. Gray surface soils have a C:N ratio of about 20:1. Other soils have a narrower ratio varying from about 10 to 13 units of C to 1 of N. The straight grain and fallow system has not maintained the N or organic matter content of the cultivated prairie soils of western Canada.-F. A. Wyatt.

8480. COOK, R. L. A mixer and sampler for greenhouse soils. Jour. Amer. Soc. Agron. 31(2): 171-174. 1 fig. 1939. 8481. DeLONG, W. A. Some observations on the work of the Macdonald College Soil Fertility Committee. Sci. Agric. [Ottawa] 19(5): 315-321. 1939.—Reports 7 years of work on soil fertility problems on a podzol occurring extensively in Eastern Quebec. Cultural treatments, application of various Na, Ca and Mg compounds as amendments, and the use of commercial fertilizers were tried. The effects of these treatments were measured by (a) biological activity of the soil (from numbers of micro-organisms, CO₂ output, and nitrate-N content), (b) yields of oats and of hay crops, and (c) the stands of clover and of timothy obtained and maintained. The greatest needs of the crops mentioned are liming and phosphatic fertilizers. The oat crop also responded to potassic fertilizers. Liming was the most efficient treatment in increasing biological activity. The Na₂CO₂ treatment was of marked benefit to the oat crop. This effect is considered to be mainly indirect and to result from decreased acidity, increased solubility of P compounds, and more efficient utilization of K. This opinion is supported by the fact that superphosphate + KCl produced

supported by the fact that superphosphate + KCl produced closely similar results in hastening maturity, and in increasing yield and weight per measured bushel.—W. A. DeLong. 8482. GALVEZ, N. L., D. I. AQUINO, and J. P. MAMISAO. Agricultural value of the fine ejecta of Mayon volcano. Philippine Agric. 27(10): 844-854. 1939.—The 10% HCl extract of the fine ejecta of Mayon volcano contains all the common inorganic soil constituents—SiO2, Al2O3, Fe2O3, MnsO4, CaO, MgO, K2O, Na2O, SO3, and P2O5—but in smaller proportions than average agricultural soils; the amount of insoluble residue is high, loss on ignition is low, and no N is present.—M. Manresa.

and no N is present.—M. Manresa.

8483. GRAY, A. L., and L. G. BRACKEEN. Soil survey of Colbert County, Alabama. U. S. Dept. Agric. Bur. Pl. Indust. 1933(22): 1-45. Map, 1 fig. 1939. 8484. HAYES, F. A., and BASIL ABASKIN. Soil survey

of Wheeler County, Nebraska. U.S. Dept. Agric. Bur. Chem.

and Soils 1933(5): 1-35. Map, 1 fig. 1939. 8485. MARSHALL, J. B., and A. E. PALMER. Changes in the nature and position of the soluble salts in certain Alberta soils after twenty years of irrigation. Sci. Agric. [Ottawa] 19(5): 271-278. 1939.—Soluble salts in the blow-out soils from Tilley, Alberta, have been determined on samples taken in one-foot sections to a depth of 6 feet. The samplings were made in the spring and autumn of 1917, 1918, and 1919, and in the autumn of 1937. The combined data show a gradual but not regular diminution in the salt conc. throughout the profile together with a downward movement of the salts indicated by a change in the depth of highest conc. Appreciable amounts of soluble salts remain in the 4th, 5th, and 6th foot depths after 20 years of irrigation, but analyses show that no appreciable change has been effected in the nature of the salts. Ca, Na, and Mg sulphates, in the order named, constitute the bulk of the salts. Bicarbonates were present and occasional traces of carbonates and chlorides were found. Some agricultural problems arising from the data are discussed.—J. B. Marshall.

8486. MORWICK, F. F., and T. J. HEEG. The relationship of certain chemical characteristics to the geological origin of some southern Ontario soils. Sci. Agric. [Ottawa] 19(5): 291-303. 1939.—Soil reaction and phosphate and potash content for soils from 3 regions in Southern Ontario which have been mapped in the soil survey are presented. These soils are all formed from glacial drift, outwash from it, or lacustrine material. The soils of the Niagara Peninsula are much more acid than those of the other 2 groups studied, probably due to the smaller proportion of limestone and larger proportion of shale in the parent soil material. There is more readily soluble phosphate in the Central Ontario soils than in the other 2 groups studied, probably due to a larger amount of apatite in the parent soil material. The largest amts. of replaceable potash are found in the Niagara Peninsula and the least in the Central Ontario area. There is also a distinct correlation between replaceable potash and soil texture, the clay soils having much higher amts. than the sandy soils.-Authors.

8487. NORIEGA del AGUILA, MIGUEL. Presencia de esteroles en el guano del Peru. Bol. Soc. Quim. Peru 4(3): 199-200. 1938.—See Chemical Abstracts 33(6): 22708. 1939.—

W. C. Tobie.

8488. WRENSHALL, C. L. Applications of the photoelectric colorimeter to soil analysis. Sci. Agric. [Ottawa] 19(4): 236-239, 1938.—The causes of the failure of colorimetric methods as quantitative procedures are associated with the visual measurement of color intensity. A photoelectric colorimeter with selective light filters, such as the Evelyn colorimeter, makes possible quantitative color measurement. With such an instrument difficulties caused by colored reagents or test solns. are eliminated. Most soil constituents could be easily and accurately detd. by photoelectric colorimetry.—C. L. Wrenshall.

HORTICULTURE

F. C. BRADFORD, Editor

(See also in this issue Entries 7071, 7126, 7171, 8068, 8350, 8520, 8528, 8572, 8618, 8619, 8620, 8621, 8625, 8627, 8631, 8679)

8489. BATCHELOR, L. D., and H. J. WEBBER. Progress report of lemon rootstock experiments. California Citrograph 24(5): 160-161, 190-191. 1939.—Over 800 trees are included in this test of the Eureka and Lisbon lemon. They were planted in 1927 at 2 locations and 17 vars. of 6 kinds of citrus rootstock are represented. At 12 years of age the sweet orange rootstock has been superior to all others. The sour orange and rough lemon stocks are apparently much better adapted to the light than to the heavy soils. The trees on mandarin orange and Sampson tangelo stocks have shown high relative resistance to gummosis and freedom from "lemon decline." They seem to be somewhat better adapted to the heavy soils than to the light ones. The trees on grapefruit stocks have been more variable and lower in yield than most of the others. There is some evidence that lemon decline is essentially a rootstock and soil adaptation problem. The sour orange stock trees were practically 100% free on the light soil but only about 50% free from decline on the heavy soils in this test.—C. S. Pomeroy.

8490. BJORNSETH, E. H. The crab apple, commercially considered. Quart. Bull. Michigan Agric. Exp. Sta. 21(3): 191-202. 1939.—Field surveys of bearing crab apple orchards in western Michigan, covering the years 1931-1936, showed that trees planted at the rate of 100 per acre averaged from slightly less than 1 bushel to 4.6 bushels per tree per year. The general average in all orchards for the entire period was 2.6 bushels. In general the trees proved to be more regular bearers than the apple and their fruits, when graded, showed a higher percentage of the better grades.—V. R.

8491. BRADFORD, F. C., and H. A. CARDINELL. A practicable method of top-working large apple trees. Quart. Bull. Michigan Agric. Exp. Sta. 21(3): 184-191. 7 fig. 1939.— Pieces of bark, $\frac{1}{4} \times 1$ -2 in., are removed from the stocks. Cions consisting of pieces of last year's shoots split lengthwise and each containing one dormant bud are cut to fit the places where bark has been removed from the stock and are tacked into place and then waxed over.—This is essentially a chip budding process. The advantages over the usual methods of cleft, bark and inlay grafting include (1) almost complete avoidance of breakage from wind, (2) avoidance of sunscald and (3) reduction of losses from wood-rotting funci.—V. R. Gradner.

avoidance of sunscard and (a) reduction of rosses from wood-rotting fungi.—V. R. Gardner.

8492. CORNFORD, C. E. Some meteorological factors affecting the distribution of frost damage to fruit trees. Jour. Pomol. and Hort. Sci. 16(4): 291-319. 26 fig. 1939.— Measurement of night temps. at various heights from the ground showed that temps. were lower over grasslands than over bare soil or in woods with the tops of the trees forming a canopy. The effects of katabatic winds (cooled air moving down slopes and valleys) and hill top winds (general winds usually fairly warm) are discussed in relation to prevention of frost injury in crops. The temp. of katabatic winds is largely detd. by the vegetation over which they pass. In undulating country the air temp. was found usually but not always to be higher at the higher levels. Use of orchard heaters and the technique of measuring their effects are discussed.—E. L. Overholser.

8493. DENNIS, JOHN A. Orchard practices in treatment of trees and soil for iron chlorosis. California Citrograph 24(6): 200. Illus. 1939.—So-called "iron chlorosis" is apparently most serious where faulty irrigation methods prevail and in soils having accumulations of lime and chlorides. Trees that have been in bad condition have returned to fair commercial production by applying ferrous citrate in holes in the trunks. Poor drainage conditions should also be corrected if possible. The best results have been secured in soils fairly low in lime and free from shallow hardpan strata. Preliminary test plots are desirable to determine local conditions and requirements before extensive chemical applications are made to soils or trees.—C. S. Pomeroy.

8494. DWYER, R. E. P. Coco-nut improvement by seed selection and plant breeding. New Guinea Agric. Gaz. 4(3): 24-102. 19 fig. 1938.—A thorough discussion of methods of selection and breeding. The insects and birds which may be responsible for fertilization are listed. The bibliography contains 68 titles.—W. D. Pierce.

8495. FAIRCHILD, DAVID. Reminiscences of early plant introduction work in South Florida. Proc. Ann. Meet. Florida State Hort. Soc. 51: 11-33. 1938.—This paper—largely historical—furnishes the background for recent horticultural progress with such fruits as the avocado, mango, citrus hybrids, and papaya, besides many other minor crops, as the chayote, dasheen, and sapotas, together with numerous cover crops and ornamentals. Of particular interest is the effect these germ plasm collections of subtropical fruits have had in the origination of new varieties through the production of natural hybrids better suited to Florida conditions than the original vars. as introduced.—T. R. Robinson.

8496. FISHER, D. F., and J. M. LUTZ. Handling and shipping strawberries without refrigeration. U. S. Dept. Agric. Circ. 515. 1-16. 9 fig. 1939.—Investigations were conducted to determine how harvesting, handling, and packing methods could be used to minimize the loss in keeping quality of strawberries because of high temps. generally encountered by nonrefrigerated shipments such as those by motor truck. Picking the fruit early in the morning was advantageous. Care in picking, harvesting at frequent intervals (generally at least every other day), and picking clean were important factors in determining the carrying quality. Berries harvested when fully ripe were of poor carrying quality when compared with those picked somewhat less mature. Replacing the standard 32-quart crate which was in use when these investigations were conducted by one designed to cause less crushing and cutting of the fruit is suggested. Training the pickers to pick carefully so as to eliminate the necessity of repacking the fruit in the shed is advisable from the standpoint of shipping quality. Facing or the use of cellophane covers had no apparent effect on the carrying quality although facing resulted in a better appearing product on the market. Decay of strawberries was closely associated with temp., especially above 40°F.—Authors.

8497. FROST, HOWARD B. Performance of new varieties of citrus since 1935. California Citrograph 24(5): 172. Illus. 1939.—Four oranges resulting from crosses made by the author were introduced for general trial in 1935, namely the

Trovita sweet orange and the Kara, Kinnow and Wilking mandarins. None of them is yet recommended for commercial planting. 3 of them continue definitely promising but the Wilking mandarin appears to be unsatisfactory unless the size of the fruit can be increased.—C. S. Pomeroy.

8498. GROVE, L. C. Growth and flowering of the gladiolus. Influence of certain morphological and physiological characteristics of the corms. Iowa Agric. Exp. Sta. Res. Bull. 253. 81-112. 1939.—High- and low-crowned corms of 9 vars. of gladiolus distributed among the primulinus, grandiflorus and primulinus grandiflorus types were used in the morphological investigations. Chem. analyses were run at several intervals during the growing season on highand low-crowned mother corms of one variety planted in the field and in the darkness. Analyses were made for alcohol soluble sugars, alcohol soluble acid-hydrolyzable sugars, alcohol insoluble acid-hydrolyzable substances, starch (plus dextrin), non-colloidal and colloidal N. In 2 seasons' comparisons of high- and low-crowned corms within vars., low-crowned corms of most vars. completed their sprouting in less time and generally produced taller flower spikes. Lowcrowned corms always produced greater total leaf area, more spikes and greater number of florets per corm than high-crowned corms. Differences in the number of florets per spike and width of florets between high- and low-crowned corms were not significant. Chemical analyses run on highand low-crowned mother corms for 2 seasons indicated differences associated with flowering results; but these differences were a result of one type of corm being called upon to deliver greater amounts of reserve materials be-cause of more shoots produced. Equal sugar contents for corresponding units of weight in dormant corms indicated that, physiologically, high- and low-crowned corms are not essentially different.—L. C. Grove.

8499. GUINIER, [0.] Mutation d'un chrysanthème. Bull. Mens. Soc. Sci. Nancy 3(8/9): 143. 1938.—A mutation in var. Mme. René Hérault combined a sport and a chimera with var. orea.—W. C. Tobie.

8500. HAVIS, L. Freezing injury to strawberry flower buds, flowers, and young fruits. Ohio State Bimo. Bull. 194. 168-172. 1 fig. 1938.—A record is presented of the nature and extent of injury to vars. of strawberries as a result of a belated frost on May 12, 1938. Varieties differed (1) in relative resistance of the receptacles of the flowers and fruits, (2) in resistance to embryo injury, and (3) in their capacity to develop marketable fruits despite some injury. All types of injury were most severe in the early opening blooms in all vars. Premier was outstanding in its resistance to embryo injury. Wayzata and Gem, everbearers, appeared especially hardy but are limited in commercial value.—(Courtesy Exp. Sta. Rec.).

8501. HOY, H. E. Blue Mountain coffee of Jamaica. Econ. Geogr. 14(4): 409-412. Illus. 1938.

8502. KENCH, J. E. The seasonal cycles of ash, carbohydrate, and nitrogenous constituents in the terminal shoots of apple trees, and the effects of five vegetatively propagated rootstocks on them. III. Nitrogenous constituents. Jour. Pomol. and Hort. Sci. 16(4): 346-363. 1939.—To determine the effect of various stocks on the chemical composition of the shoots and to compare the results with previous work by Karmarkar on Newton Wonder apple trees, the seasonal cycles of total water soluble materials, reserve carbohydrate-N relationship, total N, total non-protein N, and N as nitrate, ammonia, acid amid, humin, imide, mono-amino acid, and basic N were detd. in shoots, bark, and leaves of Lanes Prince Albert grafted on M. IX, M. V., M. VII, and M.B. stocks. Methods were similar to those used by Karmarker. Marked similarity was found between the nitrog-enous materials in Lanes Prince Albert and Newton Wonder. The seasonal cycles were different (higher total N) for shoots on M. IX but not for shoots on the other stocks. The rootstocks produced pomological differences not correlated with N content. Seasonal cycles of the various N constituents varied markedly and seasonal cycles of N constituents differed between wood and bark.-E. L. Overholser.

8503. MAHONEY, C. H. Superb Golden. A new hybrid

muskmelon. Quart. Bull. Michigan Agric. Exp. Sta. 21(3): 225-227. 1939

8504. OSKAMP, J. Soils in relation to fruit growing in New York. XII. Tree behavior on important soil profiles in the Peru, Plattsburg, and Crown Point areas in Clinton and Essex Counties. Bull. [New York] Cornell Univ. Agric. Exp. Sta. 705. 1-27. 22 fig. 1938.—By the use of soil tubes and trenches dug beneath representative trees, observations were made on the character of the soil and the type of apple root development on several different soil types in the Champlain Valley section of New York. The deepest-rooted, largest, and most thrifty trees were found where the soil profile was of a fairly uniform texture and brown, usually bright and uniform as in the Alton series, but sometimes with slight grayness and mottling as in the Vergennes. The important characteristics of the different soils are descr. and their relation to tree development is discussed. One of the most obvious soil-orchard relationships was the presence of a very compact unweathered glacial till which apple roots did not penetrate to any extent. In a few instances, bedrock was the obstructing medium. Dull color and mottled subsoils appeared more general in the Cham-plain Valley than in other fruit-growing sections of the State. In general, however, the orchard soils of the Cham-plain Valley, although formed from different rock and under slightly different conditions, exhibited essentially the same general profile characteristics in relation to orchard behavior as were found to exist in other fruit areas of the State.— (Courtesy Exp. Sta. Rec.).

8505. RICHARDS, A. V. Studies on stock-scion interaction in citrus. 1. Growth and development of seedling stocks and young grafts. Trop. Agric. [Ceylon] 91(1): 12-24. 5 pl. 1938.—A study of the relative merits of C. aurantium, C. limonia, C. maxima, and C. sinensis hybr. as stocks for grapefruit and comparison of 4 vars for the lot performance. Due to unsatisfactory performance of the last 2 scions it is suggested that only the first 2, sour orange and rough lemon, should be used as stocks for commercial grapefruit, the former for the heavy wet soil in the wet zone, and the latter for light sandy loam in both the dry zone and the wet zone.—W. D. Pierce.

8506. ROBINSON, FLORENCE BELL. Useful trees and shrubs. The Gerard Press: Champaign, Ill., 1938. Pr. \$4.50.— A reference work on useful trees and shrubs in the form of a card file, giving data on approx. 500 hardy woody plants in common use as ornamentals. The Preface states that "The data presented in this card file are average over the northern states and Canada, and have been checked against the printed observations of many authorities." The cards are filed alphabetically by the Latin names of the genera, and for each species give the native habitat, hardiness, size, form, color, season of foliage, flower, and fruit, cleanliness, aspect and value, and ecological "association." At the right of each card are blank spaces for summer and winter sketches. The cards measure 4 × 6 inches. White cards are for deciduous trees, canary for deciduous shrubs, green for conifers, salmon for broad-leaved evergreens, and cherry for vines. "The nomenclature follows Standardized Plant Names in accord with nursery practice—necessary and practical for those who wish to buy plants." There is a bibliography of about 42 titles.—C. S. Gager (courtesy Ecology).

8507. ROY, BASUDEV. Studies on pollen tube growth in Prunus. Jour. Pomol. Hort. Sci. 16(4): 320-328. 1939.— In the self-incompatible cherry Noir de Schmidt treatment of the styles with phenylacetic acid and indolylacetic acid, did not appreciably influence fruitfulness or pollen tube growth. Pollen tubes of Coe's Golden Drop plum self pollinated were arrested in growth and the tips swelled. Plum styles pollinated with compatible and partially compatible vars. allowed some pollen tubes to extend the full length of the style and effect fertilization but others were arrested, indicating the existence of 2 pollen genotypes. Prunus divaricata (diploid) crossed with P. domestica (hexaploid) set 6% while the reciprocal cross set 15%. The diploid var. had a shorter style than the hexaploid var., necessitating faster growth of the diploid pollen tube in the hexaploid style than of the hexaploid pollen tube in the diploid style. E. L. Overholser.

8508. SCHMOLE, J. F. Observations on the behavior of

buddings. India Rubber Jour. 97(9): 11-13. 2 fig. 1939.— Originally appeared in the Archief voor Rubber Cultur of Sept., 1938.—At the Avros Expt. Station, Polonia, Sumatra. observations were made on 140 Java and Sumatra clones. 19 Malayan clones, and 13 selected seedling trees of *Hevea brasiliensis*, mostly planted in 1930 and 1931. Comparisons of yield, growth, resistance to wind damage, and bark renewal were made, using clone 49 as a control. The Malayan clone, Pilmoor B 84, gave an average yield of 14.7 pounds of rubber per tree, equalling 1,500 lbs. per acre per yr., and was rated good in growth, bark renewal, and wind resistance. Only 3 of the clones tested, Pilmoor B 84, Tjiranji 16, and Avros 308, combine good growth and bark renewal with satisfactory resistance to wind damage. Of the 6 highest yielding seedlings, 5 showed good growth, bark renewal, and wind resistance.—From Review by "H. A." (L. G. Pol-

8509. SYLVA, K. J. ALEX. Notes on orchids cultivated in Ceylon. Dendrobium farmeri var. albiflorum Hort. Renanthera storiei Rchb. F. Trop. Agric. [Ceylon] 90(5): 276-277; 91(1): 25-26. 2 pl. 1938.—Brief discussions of the culture of each.—W. D. Pierce.

8510. THOMPSON, DONALD J. Tecate and Sargents's

cypresses offer promise for windbreak use. California Citrograph 24(6): 199, 225. Illus. 1939.—Comprehensive tests of all native California forms of the cypress indicate the possible value of these species in place of the widely used Monterey cypress which is so seriously affected by Coryneum cardinale.—C. S. Pomeroy.

8511. VIZCARRONDO, RENÉ. El cultivo de la vainilla en Puerto Rico. Rev. Agric. Puerto Rico 30(3): 413-421. 1938.

—A discussion of soil, seed, culture, pollenation, harvest and curing.—W. D. Pierce.

8512. WARNE, L. G. G., and JANE RABY. The water conductivity of the graft union in apple trees, with special reference to Malling rootstock no. IX. Jour. Pomol. and Hort. Sci. 16(4): 189-199. 1939.—The effect of any rootstock on a scion may result from the influence of the root, rootstock stem, the union between the rootstock and the scion, or a combination of any of these. Conductivity of unions expressed as a percentage of the mean of the conductivity of the stem above and the stem below showed that the unions of Malling IX with certain scion vars, and with M. XII were less efficient than unions of M. XII with M. XII, M. XII with certain scion vars., or M. IX with M. IX. When expressed as a percentage of the conductivity of the scion, the conductivity of the stock in double worked trees was less on M. IX stock than on M. XII stock. Conductivity was measured as grams of water flowing through a given length of stem, in a given time, under a pressure equal to a given length column of mercury.—E. L. Overholser.

8513. WITT, A. W. Walnuts. A survey of the investigations on the propagation and testing of walnuts at the East Malling Research Station. Quart. Jour. Forest. 33(1): 6-13. 1939.—Since 1925, this station has been collecting walnut vars. from all over the world and studying methods of propagating them by budding and grafting. The rootstocks used up to now have been mostly Juglans nigra, although clonal races of other spp. have been used also. Some success was had with budding, but grafting under glass in March has been the most successful and dependable method. Frost injury is one of the principal factors limiting walnut cultivation in England. The vars. in the collection are listed and descr. briefly.—W. N. Sparhawk.

8514. WOLF, CARL B. Other species of cypresses as substitutes for the Monterey. California Citrograph 24(6): 199, 222, 225. Illus. 1939.—Such serious losses have occurred in plantings of Monterey cypress in California in the past 10 years due to Coryneum cardinale that the var. is believed to be doomed in cultivation and no further plantings are advised. The Rancho Santa Ana Botanic Garden has under way a comprehensive test of all native spp. in the hope of determining disease resistant forms that will be adapted for specimen trees and windbreak plantings. Cupressus sargentii, C. s. duttonii, and C. forbesii have shown considerable promise but will require several years of testing before any recommendation will be possible.—C. S. Pomeroy. 8515. WOLFE, H. S. Some new avocado varieties. Proc.

Ann. Meet. Florida State Hort. Soc. 51: 80-82. 1938 .- A discussion of new and promising vars. for Florida. All of the new vars. recorded bear evidence of being hybrids between the West Indian and Guatemalan races. The ideal

variety or set of vars. is still to be found.—T. R. Robinson. 8516. YANOVSKY, E., and R. M. KINGSBURY. Analyses of some Indian food plants. Jour. Assoc. Offic. Agric. Chem. 21(4): 648-665. 1938.—Analyses of 119 Indian food plants of 66 spp. are presented. These analyses are not extensive enough to yield definite conclusions as to whether there is any vital difference between present-day diet and that of the aborigines. Out of 66 spp. analyzed, 6 contained inulin as a carbohydrate reserve material. Among these 6 plants

was camas root, one of the most popular foods of the northwestern Indians. Another peculiar constituent of Indian diet was lichenin of the lichens (Alectoria jubata). Attention is called to the high Ca content of hackberries (Celtis occidentalis).—From auth. summ.

8517. ANONYMOUS. Grower uses infra-red lamps for frost protection. California Citrograph 24(5): 159, 179. Illus. 1939.—Tests in a lemon orchard in West Covina, California, during freezing weather indicate that 50, 260-watt infra-red therapeutic lamps per acre influenced the susceptibility of the foliage and fruits to cold and prevented damage with a recorded temp. of 23.5°F. This treatment is still considered as entirely in the experimental stage.—C. S. Pomeroy.

FORESTRY

W. N. SPARHAWK, Editor

(See also in this issue Entries 7084, 7195, 7196, 7199, 7200, 7201, 7203, 7204, 7213, 8448, 8508, 8510, 8514, 8573, 8631)

8518. ACUÑA, RAMON A. The effect of storage on the germination of West Indian cedar. Philippine Jour. Forest. 1(3): 293-299. 1938.—Cedrela mexicana was introduced into 1(3): 293-299. 1938.—Ceareua mexicana was incoduced into the Philippines in 1915. It promises to become an important timber tree there. A lot of 536 5-month-old seedlings were planted in July 1915. In Feb. 1933, the av. diam. of the 258 surviving trees was 44.7 cm. and the height 22.45 m. Seed collected from these trees Apr. 20, 1933 and stored in bottles was subjected to cutting and germination tests at 7-day intervals until Sept. 27. Germination was greatest (97.4%) for seed sown within 21 days after maturity; that sown within 35 days had over 90% germination; within 60 days, more than 80%; within 91 days, more than 60%; and viability was 0 after 147 days.—W. N. Sparhawk.

8519. ÄKERHIELM, LARS. Laki-tall. En god variant

av högnordisk tall. [Laki pine, a good variety of northern Norwegian pine.] Skogen 25(12): 233-236. 7 fig. 1938.—This variant of Pinus silvestris grows with better form than its associates and at a more rapid rate, but is most remarkable for its extremely dense and persistent crown and its heavy

red wood.—G. S. Perry.

8520. ALLEGRI, ERNESTO. Itinerario dendrologico: Fra parchi e giardini della Lombardia Insubrica. [Dendrological notes from parks and gardens of Lombardy.] Alpe

25(11/12): 478-495. 23 fig. 1938.
8521. AMBROS, W. Unsere Waldameise (Formica rufa L.) mit besondere Berücksichtigung ihrer künstlichen Vermehrung. Centralbl. Ges. Forstw. 65(1): 15-29. 1939.—The ants of especial interest to forestry are Formica spp., particularly F. rufa and sspp. rufa and pratensis. The appearance, life history, and habits of these and other Formica spp. are descr. Ants benefit forests by spreading seeds of various plants, by acting as scavengers, and especially by destroying noxious insects. A well-distributed ant population is a most effective measure for protecting forests against insect pests. A single colony of F. rufa gathers its food from an area of 7 ha., and will protect 0.5-1.0 ha. against defoliation by the nunmoth or other insects. Forstmeister Schulz, a pioneer in the artificial multiplication of ant colonies, increased the number of colonies in a 3,500-ha. forest from 40 to 1,000 in 36 yrs., and the author increased the number on a 50-ha. tract from 10 to 311 in 10 yrs. Methods of preparing the site for a new colony and of transplanting the ants are descr.—W. N. Sparhawk.

8522. BÅNG, FREDRIK. Skogsbruk och landskapsvård. [Forestry and landscaping.] Skogen 25(13): 253-257. 10 fig. 1938.—Selection forestry is preferred to other forms generally because it gives variety and stands have vertical density, but certain other desired scenic effects can be obtained by such methods as are described from the isle of Öland, several other Swedish localities and Holland.—G. S. Perry.

8523. BROCKS, K. Die räumliche Verteilung der Beleuchtungsstärke im Walde. Zeitschr. Forst- u. Jagdw. 71(1): 47-53. 6 fig. 1939.—Studies of light intensity at various times of day beneath oak and beech stands.

8524. BROMÉE, FOLKE. Föryngringsproblem i ett tallens optimumområde i Ostpreussen. [Reproduction problem of pine in an optimum locality of East Prussia.] Skogen 25 (20): 358-361. 5 fig. 1938.—Considerable lime and clay

mixed in the sandy moraine soils stimulate such a good growth of herbs and broad-leaf trees that when mature pines are cut it is difficult for pine seedlings to become established and survive. Expts. described aim to decide what site treatment is the most effective assistance to young pine seedlings.—G. S. Perry.

8525. CARBONNIER, HENRIK. Ett bidrag till granproveniensens betydelse. [Problem of seed source with spruce.] Skogen 24(11): 229-233. 5 fig. 1937.—From an area in s. Sweden where spruce of German and Swedish origin has been planted together for 50 yrs., comparisons of thrift, quality of wood yield, tree form and other features, indicate that it is unwise to use seed of northerly origin in forestry there. Local seed from good trees of Swedish parentage is best; next is local seed from like trees of German parentage; 3rd is Danish seed from good trees of German origin; and 4th is seed from German mountain regions, preferably Thuringia.—G. S. Perry.

8526. CARTER, C. E. A field method for determining soil moisture. Australian Forestry 3(1): 15-16. 1938.—

Expts. with Bouyoucos' method on Australian soils are

descr.-C. E. Lane Poole.

8527. ECKERBOM, STEN. Skogsbruket vid Rankhyttan. [Forestry at Rankhyttan.] Skogen 24(18): 376-380; (19): 403-410. 18 fig. 1937.—This overcut and abused forest has been rehabilitated and used as a demonstration since 1919. Selection-cutting methods are used in the main, with the result that growth is much better than under the former

clear-cutting management.—G. S. Perry.

8528. FAWCETT, G. L. Notas sobre la plantacion de eucaliptos. [Notes on the planting of Eucalyptus.] Rev. Indust. y Agric. Tucuman 27(4/6): 81-84. 2 fig. 1937(1938).— Eucalyptus seedlings 20-30 cm. tall are best both for transporting and for transplanting. With taller, older seedlings, losses from root injury were greater. Autumn was the best time for planting seedlings grown in pots; late winter, for seedlings grown in nursery. In general, transplants less than 1 m. tall do not resist a temp. below -4 to -5 C. E. tereticornis seedlings 3-4 m. tall resist temps. as low as -7 C. The principal enemies of Eucalyptus are rodents ("ocultos"), ants, and grasshoppers. These are of economic importance only when the trees are young. The "ocultos" are controlled by trapping, the ants by the use of CS₂ or eyanogen in their nests, and the grasshoppers by repellent sprays and poisons.—J. W. Gilmore.

8529. FEDERICO, S. Aspetti forestali del Comasco e del Varesotto. [Forest aspects of the provinces of Como and Varese.] Alpe 25(11/12): 471-477. 3 fig. 1938.—Forests occupy 32.3% of the productive land in Como and 33.5% in Varese. More than 80% is coppice, and 10% conifer high-forest, mainly Scotch pine.—W. N. Sparhawk.

8530. FENAROLI, L. Il larice nelle Provincie Lombarde. [Larch in the provinces of Lombardy.] Alpe 25(11/12): 408-413. 7 fig. 1938.—Larch predominates on 25,695 ha. in Lombardy. It occurs naturally from 250 to 2,450 m. altitude. Its distrib. is outlined.—W. N. Sparhawk.

8531. FENAROLI, L. Caratteristiche e aspetti forestali della Provincia di Brescia. [Characteristics and forest aspects of Brescia Province.] Alpe 25(11/12): 439-449. 17 fig. 1938.—Forests occupy 22.1% of the land surface.—W. N. Sparhawk.

8532. FERRARI, N. Aspetti forestali delle Valli Bergamasche. [Forest aspects of the valleys of Bergamo.] Alpe 25(11/12): 463-470. 5 fig. 1938.—Forests, mainly coppice, occupy 28% of the productive surface of the province. W. N. Sparhawk.

8533. FIORI, ADR. La vegetazione forestale della Lombardia. Alpe 25(11/12): 399-403. 5 fig. 1938.
8534. HOFMANN, ALBERTO. Valtellina forestale.

forestale. [Forests of Valtellina.] Alpe 25(11/12): 424-438. Map, 4 fig. 1938.—Valtellina is the most mountainous province of Italy, with ½ of its area above 2,000 m. Forests, mainly of conifers, occupy 19.7% of the total surface, or 30% of the productive land.—W. N. Sparhawk.

8535. HWANG, YELLOW. Freilandversuche über

Stickstoffumsetzungen und Aziditätsänderungen in verwesender Waldstreu. Forstwiss. Centralbl. 60(21): 661-676. 6 fig. 1938.—The decomposition of leaf litter of 6 broadleaf and 4 conifer trees, on limestone soil, sand, and peat, was studied during the period Apr. 24-Nov. 28, 1935. The pH studied during the period Apr. 24-Nov. 28, 1935. of the decomposed remnants and of the underlying soil was directly related to the pH content of the original litter. Broadleaf litter generally produced a basic and conifer litter an acid reaction, although there were exceptions. Mixtures of broadleaf and conifer litter decayed more quickly than needles alone. Most of the decayed material contained relatively more N than the fresh litter. Absolute N-content was less in decomposed broadleaf and greater in conifer litter than in fresh material. The increase with conifer litter may be due to slower decomposition of the needles, which gives the N-fixing microbes a longer period of activity.—W. N. Sparhawk.

8536. JACOBS, M. R. The fibre tension of woody stems, with special reference to the genus Eucalyptus. Australian Commonwealth Forest. Bur. Bull. 22. 1-37. 19 fig. 1938.— The bulletin describes a phenomenon that is apparently general in woody plants. Successive layers of growth differentiate in slight longitudinal tension, and are held stretched by the inside core. As a result, a radially cumulative tension is built up which imposes a cumulative compression on the heartwood. In trees the heartwood is finally compressed beyond its limit of elasticity, and its mechanical properties are seriously affected. This phenomenon, called "fiber tension," causes or helps to cause brittle heart, compression failures, heart shakes in green timber, and other defects of eucalypt timber. Quantitative methods of measuring fiber tension, and the principles underlying them are described. The only exception to the general radially increasing tension found in a wide range of spp. was in the

compression wood of pines, which was under compression in a green state.—C. E. Lane Poole.

8537. JAMES, N. D. G. Lightning damage in trees.

Quart. Jour. Forest. 33(1): 16-18. 1939.—Of 161 trees reported struck by lightning in England, 1932-1935, 142 were broadleaf spp., mainly oak, elm, and ash. Scotch pine was most frequently struck of the conifers.-W. N. Sparhawk.

8538. KISSER, J., und L. W. SEKYRA. Der diagnostische Wert des mikroskopischen Aschenbildes der wichtigsten heimischen Hölzer. Mikrochem. 25(1): 157-166. 1938.—After mentioning some micromethods, including the microgas chamber, and their limitations, the author tabulates the ash picture of 62 kinds of wood according to families. He discusses presence, quantity and distribution of crystals and casts of cell elements in the ash. Of 62 investigated, 29 possessed no characteristic ash structure, 10 showed only single crystals (Ca oxalate), 6 only kernels, 9 both individual crystals and kernels and 8 casts of various cell elements—alone or with crystals present. While large quantities of wood are desirable in this work, small quantities give characteristic structures in many cases.—P. L. Kirk.

8539. LINDBLAD, OSCAR. Tyskland överger trakthuggningen. Nya skogsbruksprinciper, baserade på gallringar, genomhuggningar och självsådd. [Germany deserts clear-cutting in forestry. New practices based on thinnings, selection cutting and natural seed regeneration.] Skogen 24(7): 139-142. 5 fig. 1937.—With the object of more intensive forestry the German government forbade clear-cutting. The Dauerwald system as applied at Bärenfels, Saxony, is described as being the ideal.—G. S. Perry.

8540. PHILIPPIS, A. de. L'ambiente fitoclimatico lombardo. [Phytoclimatic zones of Lombardy.] Alpe 25(11/12): 404-407. Map. 1 fig. 1938.

8541. PODHORSKY, J. Die Spirke in den Ostalpen. Wiener Allg. Forst- u. Jagdztg. 57(3): 15-17; (4): 23-24. Map, 6 fig. 1939.—The arborescent form of *Pinus montana*, known as "Spirke," includes 2 yars. or ssp.: the mountain variety P. m. ssp. uncinata and the swamp var. P. m. ssp. uliginosa. The morph, and silvical characteristics and the distrib. of these and other forms are discussed, with notes on their growth and the quality of their wood.-W. N. Sparhawk.

8542. REYES, LUIS J., and LUIS AGUILAR. Relative resistance to decay of American and Philippine woods under Philippine conditions. Philippine Jour. Forest. 1(3): 301-325. 1 pl. 1938.—In 1928, 5 groups of test pieces, each consisting of 9 American woods used in automobile bodies (Acer rubrum, A. saccharum, Quercus alba, Platanus occidentalis, Nyssa silvatica, Fraxinus nigra, Populus sp., Ulmus americana, and Magnolia sp.) were treated with metal coatings to prevent decay and were exposed in a shaded, poorly ventilated, humid place, along with a set of untreated samples and 2 sets of untreated Philippine woods (Shorea negrosensis, S. polysperma, S. guiso, S. sp., Pterocarpus sp., Sindora supa, Pentacme contorta, Tarrietia javanica, and Albizzia acle). The test continued for 3 yrs., when all the American spp. showed severe decay. Coatings were ineffective, although tin and zinc gave partial protection. The native woods, although uncoated, outlasted the American woods.—W. N. Sparhawk.

8543. ROHMEDER, E. Der Einfluss der Mondphasen auf die Keimung und erste Jugendentwicklung der Fichte. Forstwiss. Centralbl. 60(19): 593-603; (20): 634-646. 6 fig. 1938.—Germination tests of spruce seed were run in 1935-1937, using 4 kinds of apparatus, besides sowing in pots and sowing in the open. Seed were sown at and between each lunar period during 1 or 2 months. No relation was apparent between germination % and the moon's phases. If there is any relation, it is so remote in comparison with the variation in other factors, such as warmth and moisture, as to be without practical significance.—W. N. Sparhawk.

8544. STOATE, T. N., and C. E. LANE POOLE. Application of statistical methods to some Australian forest problems. Vol. I. Australian Commonwealth Forest. Bur. Bull. 21. 1-71. 1938.—Foresters wishing to conduct field expts. now have to rely for the most part upon agricultural literature for examples of the design, statistical analysis, and presentation of the results of an expt. Examples are given of the design and analysis of simple expts. with 1-way and 2-way classification as well as of factorial experiments with factors at 2 levels and factorial designs in which confounding has been resorted to. Special types of design with split plots are illustrated. A simple application of the standard deviation and standard error is descr. and illustrated. No attempt is made to prove or explain any example fully; only such explanations are given as are necessary for application of a particular example.—C. E. Lane Poole.

8545. TRONCO, GIUSEPPE. Pioppicoltura lombarda.
[Poplar culture in Lombardy.] Alpe 25(11/12): 496-504. 8

fig. 1938.—A large area of bottom land along the Po and its tributaries is well adapted for growing poplars. Many new forms and hybrids are being developed by Dr. Giovanni Jacometti. Methods of establishing plantations are descr. briefly.—W. N. Sparhawk.

8546. TYSZKIEWICZ, STANISLAW. Über die Prüfung

des Forstsaatgutes. Forstwiss. Centralbl. 60(23): 725-738. 2 fig. 1938.—Comments on Rohmeder's paper on testing of forest tree seed [B. A. 12(5): Entry 8763].—W. N. Spar-

8547. VANSELOW, KARL. Alter, Zusammensetzung, und Aufbau natürlicher Verjüngungen. Allg. Forst- u. Jagd-Ztg. 115(2): 39-50. 1939.—A study of the composition of stands of young natural regeneration in fir and pine forests, by spp., heights, ages, stem form, vigor (prospect of survival), and extent of browsing by deer.—W. N. Sparhawk.

8548. VIADO, JOSE. Survival of bagilumbang seedlings under varying lengths of storage. Philippine Jour. Forest. 1(3): 275-281. 2 pl. 1938.—Bagilumbang (Aleurites trisperma) furnishes wood for making wooden shoes and

matches, and is one of the 2 Philippine spp. yielding lumbang oil, a substitute for tung oil. The tree has been planted successfully in several provinces, and seedlings are in great demand. 1,000 selected, top- and root-pruned wild seedlings were puddled and wrapped in bundles of 100 in sheaths of freshly cut bananas, with their tops exposed to prevent heating. All but 2 bundles, which were planted immediately, were stored in a shed; 2 bundles were taken from storage and planted at 6-day intervals in July-Aug. 1937. Living seedlings were counted in Jan. 1938. Survival ranged from 40.5% for those planted the 1st day to 7% for those planted 24 days later. Survival was fair (22.5%) up to

18 days.—W. N. Sparhawk.
8549. WALLMO, UNO. Högsjö blädningsskog 1897-1937.
Ett skogsbruk under individvård. [Högsjö selection forest (1897-1937). A forest property with individual tree treatment.] Skogen 24(8): 167-171. 5 fig. 1937.—By intensive and consistent selection on the basis of needs of each tree. over a 40-yr. period, the Högsiö forest was improved as to timber yield, quality and amount of standing timber, and site features, judged on basis of permanent sample-plot studies, prevalent tree form and other data.—G. S. Perry.

8550. WALLMO, UNO. Skogsmarkens bonitering. Några undersökningsresultat från Högsjö och Säfsjöströms skogar. [Forest soil evaluation. Some research results from Högsjö and Säfsjöström forests.] Skogen 25(20): 349-354. 4 fig. 1938.—Studies of tree form and thrift by stem analyses and other methods prove the selection system of forestry will improve the site, as judged by prevailing methods of rating the productivity capacity and in comparison with clear-cutting systems.—G. S. Perry.

8551. WITTICH. Wasserfaktor und Kiefernwirtschaft

auf diluvial Sandböden. Die Bedeutung der Bodendecke.

Zeitschr. Forst- u. Jagdw. 70(7): 337-389. 16 fig. 1938.—Soil Zetischr. Forst- u. Jagdw. 70(7): 337-339. It ng. 1938.—5011 moisture content to a depth of 1 m. under various types of cover was measured periodically. The natural moisture-holding capacity of the dry sandy soil under investigation was only \frac{1}{3}-\frac{1}{4}\$ of that computed according to the laws of capillarity. Greater or less water content at any time was due to weather conditions (rain or drought). The various kinds of cover (heather, grass, etc.) checked evap. in spring but increased water loss in summer; the soil was moister up to about June 1 and drier thereafter than bare soil. Grasses dried the soil more than other cover down to about I m. depth. Vaccinium dried out only the upper 20 cm. Humus cover retarded evap. at all seasons, and the soil moisture was greater and more uniform during the growing season than with bare soil. Cultivation of bare soil did not increase moisture, because moisture in the soil in question comes from precipitation, not from capillary action.—W. N.

8552. WOELFLE, MAX. Windverhältnisse im Walde. Forstwiss. Centralbl. 61(3): 65-75. 6 fig. 1939.—Expts. with a series of anemometers set 50 cm. above the ground around an isolated large oak showed that the wind velocity is condirectly facing and opposed to the wind direction, than the velocity of the unobstructed wind. Evaporation from the ground surface must consequently be greater, which helps to explain the dryness of the soil and lack of vegeta-

tion close to the trunks of isolated trees.—W. N. Sparhawk.

8553. ANONYMOUS. Weights of Philippine woods.

Philippine Jour. Forest. 1(3): 327-332. 1938.—Wts. per 1,000 bd. ft. and per cu. ft. are given for some 135 Philippine woods in green, partially dry, and air-dry condition.—W. N. Sparhawk.

PHARMACOGNOSY AND PHARMACEUTICAL BOTANY

HEBER W. YOUNGKEN, Editor

(See also in this issue Entries 7071, 7397, 8511, 8516, 8538)

8554. ALCOCK, N. S., and E. ARNOLD CARMICHAEL. An investigation into the treatment of Parkinsonism with Bulgarian belladonna. Quart. Jour. Med. 7(28): 565-574. 1 pl. 1938.—The comparative effect of Bulgarian belladonna root, English belladonna root, and stramonium was studied in 5 cases of Parkinsonism by means of graphic methods. In these cases there did not appear to be any advantage in using the Bulgarian belladonna in preference to the English, nor was there any appreciable difference between belladonna given as a decoction and belladonna given as the standard B.P. tincture. In 4 of the cases, preparations of stramonium were more effective than, or equally as effective as, prepns of belladonna. In one case belladonna seemed better than stramonium.—Auth. summ.

8555. CHARAUX, C., et L. PITON. Notes sur la fluorescence en lumière de Wood de divers organes et produits végétaux. Bull. Mens. Soc. Sci. Nancy 3(8/9): 148-153. Errata. 3(10-11): 160. 1938.—Color and intensity of the fluorescence of Rhamnus glucosides and their cleavage products, as detd. by a quartz Hg-vapor lamp with filter to give wave lengths greater than 3645 Å were (in order of decreasing intensity): frangulin, bright orange; emodin rhamnoside, jade green; emodin, currant red; glucofrangulin, red brown; emodin rhamnicogenol, dark grey blue. Deins. were also made on heart and sapwoods of 5 spp. of *Rhamnus* and on alcoholic extracts of the cuticle of 33

sp. of fungi and mushrooms. The results are useful in identifying different spp.—W. C. Tobie.

8556. DIEMAIR, W., H. RIFFART, und E. SCHMELCK. Über die Bestimmung der p-Oxybenzoesaure und ihrer Ester in Lebensmitteln. Mikrochem. 25(1): 247-255. 1 fig. 1938.—The authors sought a quantitative method for determining esters of p-oxybenzoic acid in foods which would be more economical than isolation. A step-photometer process, using the color with Millon's reagent, is compared with the isolation procedure. The colorimetric values are slightly lower and the errors average 10 or 12%. The esters can be separated from salicylic and benzoic acid by extraction with 5% NaHCO₈. Extinction coefficient curves are

given as well as detailed directions for the procedure.-P. L. Kirk.

8557. EDITORIAL. Bulgarian treatment of Parkinsonism. Brit. Med. Jour. 1939(4071): 75-76. 1939.—The so-called "Bulgarian belladonna" is one of the Solanaceae but not identical with belladonna. It has been claimed that extracts of the root have special properties not found in other belladonnas, and the preparation has been widely advocated in Italy and Germany. Recently Denis Hill (Lancet 1939, 2, 1048) has made a careful comparative study of the effects of Bulgarian belladonna and English belladonna on fourteen patients with the Parkinsonian syndrome and found no difference in the two decoctions. N. S. Alcock and E. A. Carmichael [see in this issue Entry 8554] compared Bulgarian belladonna, English belladonna and stramonium, checking their clinical observations with modified ergograph records, and could find no essential differences in the action of the drugs. It appears, therefore, that the claims for Bulgarian belladonna are not substantiated. It has recently been introduced into the U.S. because of its alleged potency.-J. B. Paton.

8558. FOLKERS, KARL, and KLAUS UNNA. Chazuta curare, its botanical components, and other plants of curare interest. Arch. Internat. Pharmacodyn. et Thér. 61(3): 370-379. 1939.—Plant extracts were tested on frogs for paralyzing effect, on cats for respiratory and blood pressure effects, and on mice for toxicity. Comparison was made with an arbitrary standard of curare Merck which had been used clinically (Jour. Bone & Joint Surg., 20: 754, 1933). From the ratios of doses active in the above tests, safety could be estimated by comparison of standard and test preparations. Chazuta curare, said to contain principles from Chondrodendron tomentosum, Annona ambotay, Aristolochia rumicifolia and an unknown plant not of Strychnos nor Menispermaceae groups, proved too toxic for clinical trial. The toxic properties are due to C. tomentosum, which may contain tubocurarine, since C. platiphyllum yields dbebeerine. A. rumicifolia shows a weak paralyzing activity. C. limaciifolium shows no curare effect, but may contain

protocuridine and neoprotocuridine. Telitoxicum minutiflorum contains only traces of alkaloids with curare effect. The 2 latter plants are ingredients of Tecuna curare, which must therefore owe its activity to Strychnos or Capparis plants. Macusi curare contains S. toxifera and S. cogens; the latter has no alkaloids with curare effects. Elissarhena grandiflora contains alkaloids with curare effects. Separations of quaternary and non-quaternary alkaloids were made for C. tomentosum, C. limaciifolium, T. minutiflorum and E. grandifolia.—G. A. E.

8559. HEIZER, ROBERT F. Aconite arrow poison in the Old and New World. Jour. Washington Acad. Sci. 28(8):

358-364. 1938.—Pounded roots of various spp. of Aconitum (A. ferox, A. napellus, A. japonicum) are used to poison the points of arrows or spears used to hunt whale, bear, seal, etc. These plants produce pseudaconitine, a deadly alkaloid. The distr. of this hunting technique extends from the Himalaya Mt. provinces northeasterly to Yezo, Sakhalin,

Kamchatka and across the Aleutian island chain. It is of interest in showing transmission of a cultural trait from Asia to America.—R. F. Heizer.

8560. JACOBS, WALTER A., and LYMAN C. CRAIG. Delphinine. Jour. Biol. Chem. 127(2): 361-366. 1939.— Analysis of extracts of the seeds of Delphinium staphisagria indicates a formula of C₂₀H₄₅O₃N; 4 methoxyl groups, an OH group, and possibly a N-alkyl group are present. Saponification liberates benzoic and acetic acids. Catalytic hydrogenation suggests a saturated character. Oxidation with KMnO₄ removes the salt forming properties but not the acetyl and bezoyl groups, indicating lactam formation.—I. R. Williams.

8562. ROSENTHALER, L. Über die Zusammensetzung von Drogenaschen V. Mikrochem. 25(1): 5-8. 1938.—Microanalysis of ashes of certain pharmaceuticals and barks including cinnamon, cascara, sandalwood, guaac and sassafras has been carried out and results are given qualitatively. The authors use quantitative methods including some new improvements they have devised .- P. L. Kirk.

8563. ST. PFAU, ALEXANDER, und P. PLATTNER. Zur Kenntnis der flüchtigen Pflanzenstoffe. VIII. Synthese des Vetivazulens. Helvetica Chim. Acta 22(1): 202-208.

1939.

8564. WALLIS, T. E., and J. L. FORSDIKE. Palisade ratio. Its value for detecting certain adulterants of Belladonna leaf and Stramonium, especially Scopolia carniolica and Solanum nigrum. Quart. Jour. Pharm. and Pharmacol. 11(4): 700-708. 1938.—Difficulty and confusion of other means of detecting common adulterants in Belladonna and Stramonium are cited in detail. Stable ratios given for Belladonna, Stramonium, Scopola carniolica and Solanum nigrum, and value of palisade ratio in differentiating these in broken and powdered drug samples are proven experi-mentally. Technique of determining palisade ratio is given. Palisade ratio is a constant character, useful in distinguishing leaves of different species, and in detection of common and troublesome adulterants.—H. A. McGuigan.

PLANT PHYSIOLOGY, BIOCHEMISTRY, AND BIOPHYSICS

F. E. DENNY, Editor

(See also in this issue Entries 7102, 7109, 7131, 7194, 7230, 7252, 7281, 7486, 8330, 8334, 8353, 8445, 8446, 8447, 8453, 8466, 8467, 8473, 8498, 8502, 8512, 8562, 8563, 8618, 8619, 8620, 8627, 8628)

ABSORPTION, NUTRITION

8565. DEBRAUX, M. G. Influence de diverses substances dissoutes sur la morphologie et la biologie des poils radicaux. Rev. Gén. Bot. 50(595): 378-396. 1 fig. 1938.—Observations on root cultures in various media indicated that root hair development is greater in humid air than in water, and that increasing concs. of sugars and salts in soln. produce proportional decrease in growth of root hairs. O2 apparently plays no rôle in the elongation of root hairs. Substances in soln. induce various deformities.—R. Bentall.

8566. ILJIN, W. S. Calcium content in different plants and its influence on production of organic acids. Bull. Assoc. Russe Res. Sci. a Prague, Sect. Sci. Nat. et Math. 41: 43-76. 1938.—Ca content gradually increases and is mainly dependent on the amount in the soil; in plants growing on soils rich in Ca the content may increase to 5 times the original amount or more. In plants containing dissolved oxalic acid, Ca is precipitated; in other spp., the amt. of dissolved Ca varies little or increases but slightly during summer, as the newly absorbed Ca is precipitated and thus excluded from physiological processes. Spp. vary in their ability to regulate Ca intake and those growing naturally on limestone have a lower Ca content because of regulation. Plants of one species growing in the same habitat, or different ones with like soil have a more or less fixed amount of Ca. Organic acids increase in proportion to Ca absorption but citric and malic acids resist precipitation more than does oxalic acid. Non-albuminous N increases with increase of Ca in the soil and doubtless enters into reaction with Ca.-P. D. Strausbaugh. 8567. THOMAS, WALTER, and WARREN B. MACK.

The foliar diagnosis of Zea mays subjected to differential fertilizer treatment. Jour. Agric. Res. 58(7): 477-491.

1939.—The expts. were conducted on field plots which had received during a period of 56 years fertilizer treatments consisting of N from dried blood, phosphoric acid from superphosphate, and potash as KCl. Analysis of the 3d leaf from the base at 4 periods during the growth cycle indicated that low intensities of nutrition are associated with low yields in check, P, N and NP treatments and high intensities with high yields in PK and NPK; but when "luxuskonsuraption" of K₂O occurs, low yields may be associated with high intensities of nutrition as in K and NK.

The composition of the composite *NPK-unit* (Plant Physiol.: 12, 571-600, 1937) is related to yields of grain: (1) Poorly nourished plants check, NK, N, K are characterized by low P₂O₅ in the *NPK-unit*; (2) better nourished plants P, NP with very high P₂O₅, high N and very low K₂O in the *NPK*-unit; (3) best nourished plants PK, and NPK with values for N, P₂O₅ and K₂O intermediate between those of groups (1) and (2).—Authors.

AUXINS, GROWTH HORMONES

ASANA, R. D. On the relation between the distribution of auxin in the tip of the Avena coleoptile and the first negative phototropic curvature. Ann. Botany 2(8): 955-957. 1938

8569. ENDERS, C., und M. HEGENDÖRFER. Untersuchungen über den Wuchsstoffgehalt von Hefen. Biochem. Zeitschr. 299(5/6): 346-358. 7 fig. 1938.—At the beginning of fermentation the bios content of yeast increased rapidly, reaching a maximum and then decreasing gradually through a number of maxima and minima. The periodic variation was independent of the yeast strain and the increase in yeast. There was no characteristic difference in the number and height of periods between bios-poor and normal yeast. It was suggested that the periodic variation was due not alone to chemical transformations but also to radiation effects. Results of a study of the relationship between bios activity and mitogenetic radiation were not uniform due to technical difficulties. Bios content decreased during a 48-day storage period. The bios content of *Torula utilis* was not dependent upon that of the nutrient soln.—J. M.

8570. HOWARD, H. W. Possible action of phytohormones as root-determiners. Ann. Botany 2(8): 933-942, 12 fig. 1938.—The stems of decapitated kale plants were treated with paste containing indole-3-acetic acid. Roots were first produced; adventitious shoots were also produced, subsequently or when the supply of hormone was removed. Production of a 2d batch of adventitious roots was observed when the adventitious shoots had grown for some time. Both adventitious roots and shoots were formed from meristems produced near the vascular bundles. Buds or parts of buds in the axils of the cotyledons developed as roots when the hormone was applied to the stem

higher level. The best explanation of the results is that the hormone has 2 effects: first it promotes the formation of meristems and then has a root-determining effect on these meristems. The growth of the 2d batch of adventitious roots may be due to the production of a hormone by the leafy shoots. Roots are not necessarily of internal origin.—From auth. summ.

8571. MELCHERS, GEORG. Die Blühhormone. Ber. Deutsch. Bot. Ges. 57(1): 29-48. 1939.—The biennial form of Hyoscyamus niger can be brought to blossom the first growing season by transplanting a scion of a blooming annual or biennial plant onto it. The same effect can be obtained with scions of *H. alba, Petunia hybrida*, or *Nicotiana tabacum*. Vegetative tissue can be converted to reproductive tissue by mere contact with the scion for as short a period as only 5 days. Single leaves may be used as scions. The author believes the response is due to the secretion of a hormone by the biennial plant only after a cold treatment whereas the annual forms secrete the hormone shortly after seed germination. The hormone is not species specific. The use of watery extracts of the hormone gave only negative results. Attempts are described to cause non-blossoming, sterile forms to blossom by transplanting them onto non-sterile forms. Scions of a short day variety of N. tabacum grown under either long day or short day conditions bring about the flowering of the biennial form of *Hyoscyamus* during the first season. The author suggests the name "vernalin" for the hormone which causes flowering in biennial plants in the first season in contrast with the term "florigen" which he reserves for the hormone which brings about a photoperiodic response. Comparisons of these 2 types of blossom hormones are given.—H. C. Beeskow.

GERMINATION, DORMANCY

8572. BEATTIE, J. H., and VICTOR R. BOSWELL. Longevity of onion seed in relation to storage conditions. U. S. Dept. Agric. Circ. 512. 1-22. 1939.—Four stocks of 1929 onion seed were adjusted to 6-, 8-, and 10% moisture content, then stored at room temp., 40° and 20° F, sealed in glass and not sealed, in Dec. 1929. Seeds were drawn from storage and germinated in quadruplicate in sterilized soil in the greenhouse in the spring of 1930, 1932, 1933, 1934, 1936, and 1938. Seeds sealed with low meisture content and stored at 20° F showed no significant loss of vitality after 9 yrs. There were highly significant effects of time, moisture, temp., and sealing, and also significant interactions of these factors in nearly all of the simpler combinations. High moisture and temp. were especially harmful, but low moisture or low temp. minimized the harmful effect of the other. Sealing the seeds in glass containers was generally beneficial, except at high moisture and temp. To obtain optimum preservation of onion seed original moisture should be low, not over 6%; seed should be in sealed containers and kept at 40° F or lower.—V. R. Boswell.

8573. DENGLER, A., und A. SCAMONI. Über die Keimungsbedingungen von Waldbaumpollen. Zeitschr. Forst- u. Jagdw. 71(1): 1-40. 6 fig. 1939.—The effects of cooling, heating, storage, germination medium, and other factors on viability of pollen were studied. With tap water as a germination medium, results were negative for pine, spruce and fir pollen; germination was excellent in distilled water and in cane-sugar soln. of less than 20% conc. Pollen did not germinate in damp air, nor in the open with temp. below 15° C. It germinated best in a thermostat at 25-30°. Viability was not materially reduced by dry heat at 40-41° for 24 hrs., but was destroyed by such heat for 48 hrs. Water at the same temp. did little harm in 1 hr., but considerable after 2 hrs. Short exposure to cold $(-4 \text{ to } -6^\circ)$ did little harm. Pine pollen retained a fair degree of viability for 50 days in an open room (120 days for 1 sample) and for 160-170 days in an exsiccator. Old and apparently almost dead spruce and pine pollen exposed for a short time to "effusan" (an insecticide) showed high germination. Pollen of Corylus and Alnus germinated best in 30% canesugar solution and that of Betula, Carpinus, Quercus, and Fagus in a 20% solution. There was no germination in tap water and little in rain or distilled water. Pollen stored in a cool place kept its viability longest; absolute dryness was harmful. Effusan did not stimulate germination of these spp. Oak and beech pollen remained alive about 30 days, that of elm 48 days, and ash less than 14 days. Neither ash nor elm pollen germinated in tap, distilled, or rain water. Willow pollen, which was short-lived, germinated well in rain and distilled water, practically not at all in tap water, and best in weak sugar solution or pure agar. Tilia platyphyllus germinated best in 40% sugar soln., poorly in weak soln., and not at all in distilled water.—W. N. Sparhawk.

GROWTH, DEVELOPMENT

8574. ROBBINS, WILLIAM J., and MARY BARTLEY SCHMIDT. Growth of excised tomato roots in a synthetic solution. Bull. Torrey Bot. Club 66(4): 193-200. 2 fig. 1939. —Data are given on the growth of excised tomato roots for 26 successive passages in a soln. of mineral salts, pure cane sugar and thiamin and for 20 successive passages in a soln. of mineral salts, pure cane sugar and thiazole. These synthetic solns. seem to be adequate for slow but unlimited growth. The N source was limited to nitrates.—W. J. Robbins.

8575. WHITE, H. L. The interaction of factors in the growth of Lemna. XIII. The interaction of potassium and light intensity in relation to root length. Ann. Botany 2(8): 911-917. 1938.—Variation in root length of Lemna colonies subject to 16 combinations of light intensity and K supply was studied. Length of root (with net assimilation rate) is directly related to light intensity of the order of 50-300 ft.-candles (continuous illumination) at all K levels, suggesting that root growth is closely related to carbohydrate level. Decreasing root length with falling K level is associated with falling net assimilation rate but with rising starch content, this suggesting a close relationship between root growth and sugar level of the K-starved frond. Reduction of either light intensity or K supply leads at all levels to decrease of root length. The magnitude of this fall is relatively less when both factors are decreased, and relatively greater when one factor is decreased and the other maintained at the same level.—Auth. summ.

PHOTOSYNTHESIS

8576. NAGASIMA, HIDEO. On the developmental change of quantities of chlorophyll and carotinoid in the leaves of rice plant, barley, and wheat. Jap. Jour. Bot. 9(3): 277-296. 17 fig. 1938.—Extractions were made by Schertz's modification of the Willstätter-Stoll method, and quantities were measured by the spectroscopic method. 2 maxima appear in the quantitative variation-curve of carotinoid pigment; one coincides with the period of most active growth, and the other with the phase of reproductive activity. The same type of curve was obtained in the study of chlorophyll pigments but the "second hump of increase is somewhat uncertain."—P. D. Strausbauah.

ments but the "second hump of increase is somewhat uncertain."—P. D. Strausbaugh.

8577. ROSS, WILLIAM F. The phyllochromogen of protoporphyrin and pyridine. Jour. Biol. Chem. 127(1): 163-167. 1 fig. 1939.—A new type of compound is described, a phyllochromogen, formed by the addition of pyridine to porphyrin phyllin derivatives. Analogy is drawn to chlorophyll in nature.—I. R. Williams.

TRANSPIRATION, WATER RELATIONS

8578. GÄUMANN, ERNST. Über die experimentelle Auslösung der Guttation. Ber. Deutsch. Bot. Ges. 56(9): 396-405. 1938.—Guttation is an index of root activity. Water absorption by roots is independent of atmospheric humidity. In contrast with a number of tropical plants the 4 plants investigated (Mimulus cupreus, Brassica napus, tomato, and potato) showed some stomatal transpiration in a practically saturated humidity. Transpiration in M. cupreus and B. napus was great enough at a relative humidity of 70% to offset the excess water absorption and storage and therefore no guttation took place. Water absorption by the roots of these plants was great enough at a wide soil temp. range (3-30°) to cause a water accumulation in the plant and therefore guttation. In the potato and tomato, however, the rate of absorption by the roots exceeds transpiration only if the soil temp. is equal to or higher than the tir temp. A sudden drop or rise of 15° in soil temp. causes a shock in the roots which retards water absorption. Due to

this shock no guttation takes place even in those plants which ordinarily exhibit guttation.-H. C. Beeskow.

RESPIRATION

8579. GERHARDT, FISK, and BOYCE D. EZELL. A method of estimating the volatile products liberated from stored fruit. Jour. Agric. Res. 58(7): 493-503. 1939.—A procedure is described for the measurement of the total oxidizable volatile emanations from stored fruit. The method is based on the absorption of these substances in conc. H.SO₄, oxidation with ceric sulfate and evaluation in terms of ceric sulfate reduced. Acetaldehyde is used as the reference standard for establishing the optimum conditions for the oxidation with ceric sulfate. Applications of the method include measurement of the volatiles in the storage air from three different sources, the interrelation of respira-tion and liberation of volatiles from Golden Delicious apples, and the emanation of volatiles as influenced by the presence of certain fruit rot fungi. This method requires the use of simple laboratory equipment and common reagents. It is applicable to simultaneous analysis of a large number of samples and can be used in conjunction with respiration

determinations. It possesses the accuracy of all iodometric procedures.—F. Gerhardt.

8580. NIELSEN, NIELS, und DANIEL DRESDEN.
Untersuchungen über die Temperaturabhängigkeit der Respiration bei Aspergillus niger. Compt. Rend. Trav. Lab. Carlsberg [Copenhagen] Ser. Physiol. 22(18): 287-301. 1939.—The influence of the temp upon the respiration of A. niger was investigated. The values found for Q_{10} fall with increasing temp.; Q_{17} 17/7 is 3.2, Q_{17} 37/27 1.7. Q_{17} 32/22 was detd. in mycelium of different ages and found independent of the age; the respiration was much stronger in young than in old

mycelium.—N. Nielsen.

8581. SARAN, A. B. A short note on the rate of respiration and respiratory quotient of starved leaves of Aralia Sp. before and after a course in nitrogen. Jour. Indian Bot. Soc. 17(5/6): 287-294. 1938.—Respiration of the leaves of Aralia sp. in air and in a N₂ atmosphere was detd. by the continuous current method at 28.5°C. When pure N₂ was substituted for air at or beyond 44 hrs. of starvation, the rate of respiration became temporarily enhanced; the same treatment given at an earlier stage (i.e., at 22 hrs. of starvation) led to lowering of the respiration rate. In both cases, however, when air was again admitted after the course (6 hrs.) in N₂, the rate of respiration temporarily increased much beyond the rate in N₂, thus surpassing the original air-value. Maximum value for the "after-effect" of N₂ treatment (i.e., the difference between the original and subsequent highest air-value after a course in N₂) was obtained for the leaves starved for 44 hrs.; as the period of starvation advanced this value fell. After a course (6 hrs.) in N₂ the respiratory ratio was low (.70 to .75) for about 4 hrs., and then returned to its normal value i.e., unity.—A. B. Saran.

CARBOHYDRATE METABOLISM

8582. BORGSTRÖM, GEORG. Citrate in Crassulacean leaves. Skand. Arch. Physiol. 80: 52-58. 1938.—In 1934 the author demonstrated that citric acid, as well as malic acid, plays an important rôle in the acid metabolism of succulent plants.—Now, the diurnal changes of citric acid content, in Crassulacean leaves, detd. by Thunberg's micro-detn. method, shows that citric acid takes part in the diurnal acidity changes in these leaves.-H. Kalckar.

8583. LÏSÏTZYN, D. I. Säkhärä ässümülürunshchikh list'ev. IV. Isslědovanïé fräktziï säkhärosy ï fräktziï mäl'tozy v list'iakh. [Sugars of assimilating leaves. IV. Investigation of sucrose fraction and maltose fraction in leaves.] [In Russ. with Eng. summ.] Biokhimiiā [Biochem.] 3(4): 490-499. 1938.—Reducing sugars, change in rotation and fructose/glucose ratio were detd. after hydrolysis. Easily hydrolyzable laevo-rotatory substances, yielding glucose but no fructose on hydrolysis, are present in some plants. These substances may sometimes play the part of sucrose in leaves. The "sucrose fraction" in some instances may consist of a mixture of fructosides, sucrose and glucosides. No maltose was detected in leaves, the fraction of difficultly hydrolyzable sugars evidently consisting of different glucosides.—E. K. Johnson.

8584. RUSSELL, R. S. Physiological studies in plant nutrition. IX. The effect of mineral deficiency on the fructosan metabolism of the barley plant. Ann. Botany 2 (8): 865-882. 2 fig. 1938.—Barley plants were grown in sand culture under 12 manurial treatments, comprising various levels of K, P, and the balance of Na and Ca. Separate extracts of fructosan and the other water-soluble carbohydrates in leaves and stems were made on 3 occasions during the development of the plant. To facilitate the extraction of stems prior to analysis a grinding mill was devised (described in the appendix). The effects and interactions of manurial treatment on fructosan content are discussed; conc. of fructosan is lowered by K deficiency, especially in the high Na treatments. Deficiency of P increases the level of fructosan. The ratio of fructosan to other sugars is in general affected by treatment in the same way as is the conc. of fructosan. Statistical analyses show that in stems this ratio is entirely dependent on the conc. of total sugar, the ratio being high when the conc. of total sugar is high. In leaves a similar relationship holds, but in addition K deficiency and the balance between Na and Ca show effects independent of conc. charges. For a given conc. of total sugar the fructosan ratio is higher in stems than in leaves. This may be a result of rapid translocation from the leaves. The relationship between conc. of fructosan and its ratio to other sugars appears to be independent of the age of the plant in both leaves and stem during the period of vegetative development.—These results are compatible with the view that surplus sugar is temporarily stored as fructosan.—Auth.

8585. SCHERBAKOV, A. P. Vlitanïé kalita nä uglevodnyī obměn v list'takh täbäkä. [The effect of K on the carbohydrate metabolism of tobacco leaves.] [In Russ. with Eng. summ.] Biokhimia [Biochem.] 3(4): 417-429. 1938.—Infiltration of tobacco leaves with KCl and KsO4 solns. caused a greater intake and greater retention of water than in case of infiltration with water. Infiltration of leaves kept in the dark retarded the rate of catabolism of organic substances; leaves infiltrated with H_2O and glucose lost 30-35% of sugars but those infiltrated with K soln. accumulated sugars. In the light, the leaves infiltrated with K soln. accumulated more sugars than those infiltrated with H₂O or glucose. In the dark, the reducing capacity of sugars was greater in leaves infiltrated with H_2O or glucose but in sunlight formation of reducing segars was greater with K salts. The same results were obtained in expts. with pea leaves.—E. K.

Johnson.

8586. WATSON, D. J., and I. W. SELMAN. A comparaive physiological study of sugar-beet and mangold with respect to growth and sugar accumulation. II. Changes in sugar content. Ann. Botany 2(8): 827-846. 1938.—An account is given of the changes during growth in the sucrose and reducing sugar content (expressed per 100 g. of dry matter and per 100 g. of water) of the lamina, petiole, and root of sugar-beet and mangold sown on 6 occasions in 1934. Sugar-beet had a higher content of both sucrose and reducing sugars than mangold, except that the sucrose content of the lamina was almost the same in the 2 plants, and in the root the reducing sugar content was greater in mangold. In general, both the sucrose and reducing sugar content of all parts of the plant increased steadily with time. The sucrose content increased through the plant in the direction from lamina to root. The reducing sugar content was highest in the petiole, and was greater in the lamina than in the root; this does not necessarily imply that translocation takes place against a gradient of sugar conc., for gradients falling in the direction of movement may exist in the conducting tissues, which are masked in the mass analyses of lamina, petiole, and root. The data give little direct evidence on the mechanism of translocation, but they illustrate some fallacies in the arguments of Davis, Daish, and Sawyer for the view that sucrose in the leaf is an immediate product of photosynthesis and that carbohydrate is translocated as hexose. There is no clear distinction in the root between a phase of growth and a phase of sucrose storage, for the very young roots have a high sucrose content. Growth and accumulation of sucrose proceed together. On the mean of all sampling times, a significant increase of sucrose content was found in the leaf lamina, between 10 a. m. and 4 p. m. The corresponding increase in reducing

sugar was smaller and not significant. The average changes during the day in the sugar content of the petiole were almost the same as those of the leaf lamina, but were not significant. There was no indication of any diurnal variation in the root. Later sowing caused an increase in the reducing sugar content and, to a less extent, in the sucrose content of the leaf lamina, in the later stages of growth. The reducing sugar content of the petiole was similarly affected, but the sucrose content of petiole and root was always depressed by later sowing. The reducing sugar content of the root was also slightly decreased. These results suggest that the effect of later sowing, previously demonstrated, in increasing the size and weight of the leaves, was caused by a restriction of the movement of carbohydrate out of the leaf, rather than by an increased ability of the leaf to utilize assimilate in growth. Later sowing depressed the total yield per acre of sucrose in the root.—Auth. summ.

NITROGEN METABOLISM

8587. BRUNEL, M. A., et R. ÉCHEVIN. La presence, l'origine, et le role physiologic des uréides glyoxyliques dans les germinations de Soja hispida Mnch. Rev. Gén. Bot. 50 (590): 73-93. 1938.—A critical review of the literature is given, with especial reference to the methods employed by other workers. Germinated and ungerminated seeds and seedlings were analyzed. The authors, using fresh material, found no urea in S. hispida (contrary to other workers). Allantoic acid was detd. with the aid of a spectrophotometer. Allantoinase and its extraction and ability to produce allantoic acid from allantoin by hydrolysis are discussed. Uricase is credited with splitting uric acid into allantoin. A new enzyme, allantoicase, breaks down allantoic acid into urea and glyoxylic acid. Allantoicase, allantoin, and allantoic acid are present in L. albus and A. githago also. Both uricase and uric acid are said to be absent from these 2 species, and from S. hispida also.—R. K. Zuck.

2 species, and from S. hispida also.—R. K. Zuck.
8588. HARTELIUS, VAGN. Untersuchungen über die
Stickstoffassimilation der Hefe. XII. Vergleichende Untersuchungen über den Wert der Aminosäuren als Stickstoffquelle für Hefe. Compt. Rend. Trav. Lab. Carlsberg [Copenhagen] Sér. Physiol. 22(19): 303-322. 1 fig. 1939. Also in: Biochem. Zeitschr., 299: 317-333. 1938.—The effectiveness of certain amino acids as N₂ sources for Saccharomyces cerevisiae was detd. when there was also present an excess of (NH₄)₂SO₄. Expressing the ammonia N utilization as 100, the amino acid N utilization was relatively expressed. The normal amino acids from C_2 to C_5 were utilized (C_7 not investigated), C_2 and C_5 being least and the others in the order of the length of the chain. The relative number (X) was 30-35. Substitution of a methyl group on the β and γ C atom reduced the utilization, β substitution being more effective. Introduction of a phenyl or hydroxyphenyl group on β C atom of alanine was without effect, but β hydroxy substitution greatly increased utilization. Leucyl-glycine and glycyl-leucine were utilized less than leucine and better than glycine with glycyl-leucine being the lesser of the two. X for aspartic acid and asparagine was about 200. Glutamic acid was utilized very little or not at all in contrast to its good utilization in the absence of (NH4)SO4. Arginine was well utilized but urea not at all.—J. M. Little.

8589. LUGG, JOSEPH WILLIAM HENRY. The representativeness of extracted samples and the efficiency of extraction of protein from the fresh leaves of plants; and some partial analyses of the whole proteins of leaves. Biochem. Jour. 33(1): 110-122. 1939.—Samples of protein extracted from fresh plant leaves by various methods all involving maceration with solvents followed by removal of cell debris, have been compared in composition with the whole proteins of the leaves and with those contained in the leaf residues. Amide, tyrosine and tryptophan contents and sulphur distributions (cystine + cysteine and methionine contents) were estimated for this purpose. If due precautions are not taken there is a tendency preferentially to leave protein associated with the "granule" fraction (nuclei, plastids, mitachondria, etc.) in the residues. Most of the protein of this fraction passes into soln. in mildly alkaline buffers (pH 9) on the addition of miscible lipoid solvents (alcohol, ether), and their use in the preparation of purer samples of reasonably representative protein is demonstrated.

The partial analyses of the whole proteins of the leaves provided no evidence of variation in composition with the age of the leaves or the manurial and climatic conditions or locality of growth, but composition may vary with plant species — I W H Luca

locality of growth, but composition may vary with plant species.—J. W. H. Lugg.

8590. PETRIE, A. H. K., and J. G. WOOD. Studies on the nitrogen metabolism of plants. III. On the effect of water content on the relationship between proteins and amino acids. Ann. Botany 2(8): \$87-898. 1938.—There are 2 ways in which water content may produce an effect on the relation between the amts., expressed on a dry-weight basis, of proteins and amino acids; by changing in the concs. of these compounds, or by specifically altering the rate of one or more reactions in the system. The conc. effect could arise if the curve relating the concs. of proteins and amino acids in the cells were concave to the amino acid conc. axis. Evidence that this is the case is brought forward, partly from new experimentation. The water content of the tissue affects protein synthesis and hydrolysis, and also the amount of protein seems to be a factor determining the water content. Decreasing water content could also lead to protein hydrolysis if it caused a decrease in conc. of one or more amino acids. Water might thus have a specific effect. If, however, the decrease in conc. of one amino acid was associated only with increase in conc. of the total amino acids, then the effect of water might be purely a concentration one. The difference between the 2 types of effect would be expressed in the presence or absence of water content as a parameter in the relation between the concs. of amino acids and proteins. The amt. of one amino acid, viz. cystine, does not always increase, and sometimes actually decreases, when the amount of the other amino acids increases; however in the expt. in which this was demonstrated, water and amino acid contents were negatively correalted, so that it cannot be concluded whether decreasing water content directly, or increase in conc. of the amino acids, is associated with cessation of increase in cystine content.—Auth. summ.

PROTEIN METABOLISM

8591. DASTUR, R. H., U. K. KANITKAR, and M. S. RAO. The formation of proteins in leaves in light of different quality. Ann. Botany 2(8): 943-953. 1938.—In continuation of the previous work on carbohydrate content of leaves exposed to light of different qualities the water-soluble, organic N content of leaves of Helianthus annuus, Ricinus communis, Abutilon asiaticum, Tropaeolum majus, Raphanus sativus, and Nicotiana tabacum were examined. The order of increase of the water-soluble N of the leaves in different lights of equal total intensity is carbon arc > "day-light" lamp > ordinary electric lamp > daylight. If monochromatic light and daylight are compared the organic N content with low light intensity is in the order daylight> red light=blue-violet light. With high intensity, using the carbon are, the blue-violet is more effective than the red. Explanation: during the process of photosynthetic assimilation there is a condition of balance between protein formation and carbohydrate production. When the ratio of the intensity of red to blue-violet ray is high, as in ordinary electric light, the carbohydrate production is depressed and the formation of proteins is limited by the carbohydrate supply; when the ratio is low, as in daylight, the rate of carbohydrate production and the rate of protein formation is depressed by the accumulation of carbohydrates; with an intermediate condition, as in the light of the carbon arc, both processes go on actively, protein formation being more active than in ordinary electric light.— From auth. summ.

ENZYMES

8592. CALDWELL, M. L., S. E. DOEBBELING, and F. C. Van WICKLEN. A study of the influence of heavy water upon the activities and upon the stabilities of the amylases of barley and malted barley. Jour. Amer. Chem. Soc. 61(1): 125-127. 1939.—Heavy water (99%) has no appreciable influence upon the hydrolysis of starch as catalyzed by afor β -amylase provided the conditions of the hydrolysis are such as to minimize the deterioration of the amylase and favor its action. Inactivation of plant amylase is less

rapid and less pronounced in highly purified heavy water than in ordinary water.—H. N. Glassman.

STOMATA

8593. MONZI, MASAMI. Beeinflussung der Spaltöffnungsweite durch plötzliches Wasserabsperren und -zuführen, mit besonderer Berücksichtigung der Spaltöffnungsbewegung zur Regenzeit. Jap. Jour. Bot. 9(3): 313-334. 4 fig. 1938.—Using mature leaves of Fatsia japonica and sealing the cut end of the petiole the author observed a rapid opening of stomata followed later by closing movements. If water was supplied at the point of maximal opening a quick closure ensued, but if stomata were tightly closed by reason of prolonged exclusion of water, a brief period of opening was noted, followed by a new rapid closure. When water was supplied after the minimal opening occurred there followed in both cases a gradual widening of the apertures. The opening of the stomata induced by the exclusion of water supply is comparable to the acceleration of opening movement after cessation of rain. The sudden closing of stomata following renewed water supply is analogous to stomatal closure appearing at the beginning of rain. The brief opening period of the rather reduced stomata of the long sealed leaf, almost always preceptible when the water supply is restored, corresponds to the opening of stomata of a wilted leaf when rain occurs. Stomatal movements are induced by changes in the water supply of the leaf tissues, but almost not or not at all in the increase or decrease of cohesion tension within the conductive vessels. The stomatal openings passive in a certain sense may be regulated through the turgor conditions within the subsidiary and epidermal cells. With changes in water supply transpiration corresponds almost completely with stomatal movements: with exclusion of water, transpiration increases; with renewed water supply increased transpiration increases; with renewed water supply increased transpiration suddenly decreases; in contrary fashion the lowered transpiration of wilted leaf deprived of water for a long time, quickly increases. However, besides the chief regulation of stomatal openings, the water content of the leaf tissues and cohesion tension in the vessels may represent more or less regulative factors in transpiration.—P. D. Strausbaugh.

PLANT CONSTITUENTS

8594. ANDERSON, CAMERON GORDON, WALTER NORMAN HAWORTH, HAROLD RAISTRICK, and MAURICE STACEY. Polysaccharides synthesized by microorganisms. IV. The molecular constitution of luteose. Bioorganisms. IV. The indecutar constitution of intense. Exochem. Jour. 33(2): 272-279. I fig. 1939.—Luteose, the neutral polysaccharide produced by elimination of the malonyl residues from luteic acid, a metabolic product of *Penicillium luteum*, is constituted mainly of \(\beta\)-glucose units linked through the 1,6-positions. The molecule may be a terminated of the product of th nated linear chain but determination of its mol. weight (84 units) by osmotic pressure measurements and the

presence of dimethyl glucose (10%) among the products of hydrolysis of methylated luteose, indicates that the molecule is more likely to be of the closed chain type. Luteose may be termed a β -dextran.—Auth. summ.

CHEMICAL CONSTITUENTS

8595. BENVAL, H. Le fructoside des Elymus et la classification des Hordéinées. Rev. Gén. Bot. 50(589): 16-21. 1938.—The genera Triticum and Agropyrum have been shown previously to be separable on the basis of their fructoside content, producing levosine and triticine respectively. A new glucoside, "elymoside," isolated from Elymus arenarius, E. sabulosis, and E. curvatus, closely resembles a fructoside extracted from a bulbous barley. On the basis that H. bulbosum may contain elymoside, it is thought that this species may be closer to Elymus than H. vulgare which contains levosine. Because of the lack of complete information, the separation of certain species of *Hordeum* and *Elymus* is left tentative.—*R. K. Zuck*.

8596. OXFORD, ALBERT EDWARD, HAROLD RAISTRICK, and PAUL SIMONART. Studies in the bio-

TRICK, and PAUL SIMONART. Studies in the biochemistry of micro-organisms. LX. Griseofulvin, $C_{17}H_{17}O_6CI$, a metabolic product of Penicillium griseo-fulvum Dierckx. Biochem. Jour. 33(2): 240-248. 1939.—Griseofulvin, $C_{17}H_{17}O_6CI$, M.P. 218-219°, a hitherto undescribed ketonic mould metabolic product, was isolated from the mycelium of Penicillium griseo-fulvum grown on a modified Czapek-Dox solution. The general properties of griseofulvin are descr. together with a number of derivatives (including the library derivative) and described production production production. descr. together with a number of derivatives (including the dihydro-derivative) and degradation products (including orcinol (by KOH fusion) and 3-chloro-2-hydroxy-4,6-dimethoxybenzoic acid (by KMnO₄ oxidation)). A provisional structural formula is assigned.—A. E. Oxford.

8597. SCHMITT, FRANCIS O., and G. T. JOHNSON. Optical and chemical studies on the granules in microspores of Tradescantia. Ann. Missouri Bot. Gard. 25(2): 455-466.

1 pl. 1938.—Optical studies show that the granules present a positive spherita gross. Migrophemical tests for lipidia and control of the state of the

positive spherite cross. Microchemical tests for lipoids, carbohydrates, and proteins were inconclusive. The granules are digested by trypsin, but not by pepsin or diastase. Solubility data and destruction by higher temps. and certain reagents suggest, in connection with other observations, that

they are composed primarily of protein.—F. R. Fosberg. 8598. TIEGS, E. Über den Schwefelgehalt der Blätter von Helianthus annuus. Ber. Deutsch. Bot. Ges. 56(1): 26-29. 1938.—Daily and annual variations in total dry weight and in the S content of the leaves of Helianthus annuus are given. The dry weight per unit area increases during the growing season in 24 out of 29 cases. There is an increase in dry weight in the afternoon over the forenoon in 14 out of 20 cases. The increase in S in the afternoon over the forenoon is not significant but there is a marked monthly increase in sulphur during the growing season.—H. C. Beeskow.

PHYTOPATHOLOGY

FREEMAN WEISS. Editor

(See also in this issue Entries 7066, 7069, 7133, 7171, 7850, 8211, 8396, 8477, 8489, 8496, 8542, 8637, 8645, 8736)

DISEASES CAUSED BY FUNGI

8599. BAKER, R. E. D. Studies in the pathogenicity of tropical fungi. II. The occurrence of latent infections in developing fruits. Ann. Botany 2(8): 919-931, 1938.—An account is given of previous investigations, conducted both in temperate regions and in the tropics, which have shown that certain pathogens gain entry into unripe fruit before the normal time of harvesting. Latent infections are thus produced which are usually invisible when the fruit is picked and only become conspicuous during the later stages of ripening. Colletotrichum gloeosporioides (Glomerella cingulata), Guignardia sp., Phomopsis citri and Dothiorella ribis occur as latent infections in fruit in Trinidad. Other slow growing fungi, as yet unidentified, occur occasionally. An account is given of the fungal flora of grape-fruit orchards, and this is compared with those of the mango and the avocado pear. The relative abundance of the several fungithat cause latent infections in tropical fruits is discussed. The latent infections of *C. gloeosporioides* are established in citrus fruits, mangoes and avocado pears shortly after the fruit is set, the decaying floral parts being in some instances the probable source of infection.—From auth.

8600. BENNETT, F. T. Fusarium disease of cereals. Jour. Min. Agric. [Gr. Brit.] 45(11): 1115-1118. 1939.—This is an exposition in popular terms of the diseases of various cereal crops (wheat, barley, rye, oats) caused by spp. of Fusarium. Symptoms and etiology are discussed in general terms, emphasis being placed on the damage to stands caused by the root-rot phase, and to molding of grain. The relations of soil conditions such as drainage, tilth and fertility to susceptibility are described; and the potentialities of control by seed treatment, choice of varieties, and adjust-ment of time of sowing to weather and seasonal conditions are set forth.

8601. DUTHIE, D. W. Coconut wilt in Essequibo and

Pomeroon Districts. Agric. Jour. Br. Guiana 9(3): 147-152. 1938.—Wilt disease of coconuts on the heavy clay soils of the Essequibo Coast is probably caused by planting coconuts on old cane beds, where the subsoil is too compact and saline to allow easy root penetration, with the result that the topsoil becomes a mass of roots, and percolation of water is greatly hindered. When evaporation from the soil surface is increased by clean cultivation or by the death of a few trees, wilt appears and spreads slowly in the direction of the prevailing wind.—W. D. Pierce.

8602. FELLOWS, HURLEY, and C. H. FICKE. Soil infestation by Ophiobolus graminis and its spread. Jour. Agric. Res. 58(7): 505-519. 1939.—Expts. showed that O. graminis, the causal organism of take-all, may be distributed by certain methods known to carry soil-borne parasites. Its establishment and spread in a new location is slow and uncertain. The infected root system of the living host plant distributes O. graminis in the soil and helps to establish it in a new location. Non-infested soils were given various degrees of infestation by mixing different amounts of infested soil, or water suspensions from infested soil, with them. A mixture of 25% infested soil by volume was necessary for the production of an appreciable amt. of disease the 1st year on wheat grown in the greenhouse. Successive crops in this soil were more severely diseased. This was not true, however, where a mixture of 15% infested soil was used. Water suspensions, when mixed with noninfested soils, caused disease on wheat only after 2 years' cropping in the greenhouse but not during 3 years in the field. Even if infested and noninfested soils are in contact with each other, i.e., one layer next to the other, there is no spread of O. graminis unless wheat roots grow through both soils, or unless the soils are mixed. Often infested soils lose their potency if in contact with non-infested soil and not mixed. The refuse of infested plants and also ascospores are good carriers. Generally ascospores are not formed and are short lived. Soils artificially infested with pure cultures remained infested over a long period. Methods of soil infestation in the greenhouse are more positive than in the field .- H. Fellows.

8603. TOMPKINS, C. M., P. A. ARK, C. M. TUCKER, and J. T. MIDDLETON. Soft rot of pumpkin and watermelon fruits caused by Pythium ultimum. *Jour. Agric. Res.* 58(6): 461-475. 3 fig. 1939.—A soft rot of Zucchini and Mammoth Summer Crookneck pumpkin and watermelon fruits, prevalent in California, is descr. The disease occurs when fruits of any size or age are in contact with wet soil and is favored by cool weather. Symptoms consist of soft, sunken, watersoaked lesions which quickly enlarge, causing the underlying tissues to collapse. Invaded fruits may be completely rotted within 6-10 days after infection. The causal organism is P. ultimum. Certain cucurbit isolates did not produce obspores, but were indistinguishable from normal cultures by growth or pathogenic characters. Reproductive bodies resembling oögonia developed in cultures of nonoöspore-producing isolates. Absence of oöspore formation may be due to failure of the organism to develop antheridia. The temp. relations of the organism were detd. The minimum was 4° C, optimum 25° to 28°, maximum 40°. All cucurbit isolates, including the 2 nonoöspore-producing cultures, isolates from roots of alfalfa, tobacco, and spinach and a culture from an unknown host, had identical temp. relations. Infection of healthy pumpkin and watermelon fruits was obtained by inoculation in the laboratory, but wounding of watermelon fruits was necessary in order to induce decay. All isolates caused damping-off of pumpkin, watermelon, and tomato seedlings during the pre-emergence and small-seedling stages of growth; older plants were resistant. Green and ripe tomatoes, eggplant, beans, and field pumpkin proved susceptible to infection, without wounding, under laboratory conditions. When wounded, the following hosts proved susceptible: Apple, bell pepper, squash, pumpkin (2 vars.), watermelon, Casaba, Honeydew, and Persian melons, cucumber, turnip, rutabaga, carrot, parsnip, potato. lemon, sweet orange, onion, and sweet potato.—Authors.

8604. WOLF, FREDERICK A. Status of investigations of tobacco downy mildew. Phytopath. 29(2): 194-200. 1939.—Consideration is given to the status of our knowledge regarding endemism of Peronospora tabacina, sources of

inoculum, dissemination of sporangia, and the relation of weather to the disease. The lack of essential information regarding the oospore stage and regarding possible resistance of recovered seedlings is indicated. Although the use of benzol provides a means of control of tobacco downy mildew, fundamental problems relative to its use remain unsolved.—F. A. Wolf.

DISEASES CAUSED BY BACTERIA

8605. PALUCH, JAN. Experiments on the virulence of some strains of Pseudomonas tumefaciens and Phytomonas rhizogenes, and on the influence of some digestive ferments on the experimental crown-gall. [In Polish with Eng. summ.] Acta Soc. Bot. Polon. 15(1): 37-46. 1 pl. 1938.—Several isolates of Pseudomonas tumefaciens and Phytomonas rhizogenes received from the Univ. of Wisconsin, the Lister Institute and several isolated at Krakow, Poland, were inoculated into Pelargonium. Only 1 (Lister Institute) proved infective for this plant. Of 30 galls produced by this isolate 11 were treated with papain, 11 with pepsin, and 8 were kept as checks. Of the 11 galls treated with papain 6 deteriorated; of those treated with pepsin 3 deteriorated; and 4 of the 8 check galls deteriorated. The author's conclusion is that enzymes are not always effective in the treatment of crown gall.—W. H. Burkholder.

DISEASES CAUSED BY ANIMAL PARASITES

8606. DOCTERS van LEEUWEN, W. M. An ambrosiagall on Symplocos fasciculata Zoll. Phytopathology. Ann. Jard. Bot. Buitenzorg 49(1): 27-42. 5 pl. 1939.—The gall develops on the young twigs and is formed by a gall-midge, Asphondylia bursaria. The inner wall of the gall is covered with a fungus tissue. The midge deposits its eggs and 1-4 fungus spores in a hole formed by its ovipositor. The larva hatches after a few days, but remains small until the fungus has filled the whole gall-chamber. Then the larva feeds on the fungus, grows quickly and pupates. The egg is surrounded by 2 walls, an outer thick one with a fine micropyle at one end through which the inner wall protrudes. During oviposition the end of the egg comes in contact with the inner end of the narrow ovipositor and the contents are pressed through the micropyle. When the folded egg leaves the outer end of the ovipositor the contents return into the egg proper. This gall is one of the so called ambrosia-galls.—W. M. Docters van Leeuwen.

8607. PENSO, GIUSEPPE. Su alcune Anguillulinae parassite degli ortaggi in Libia e sul modo di combatterle.

8607. PENSO, GIUSEPPE. Su alcune Anguillulinae parassite degli ortaggi in Libia e sul modo di combatterle. [Some parasitic nematodes of the gardens in Libia and the method of combating them.] Ist. Sanità Pubblica Rend. [Rome] 1(2): 630-646. 6 fig. 1938.

VIRUS DISEASES

8608. BEST, RUPERT J. The preservative effect of some reducing systems on the virus of tomato spotted wilt. Australian Jour. Exp. Biol. and Med. Sci. 17(1): 1-17. 1 fig. 1939.—Hydrogen in the presence of platinized Pt arrested the normal aerobic inactivation of the virus, and thereafter maintained the activity at a constant level for the duration of the expt. (8 hours). Suspensions of the virus in the presence of cysteine and absence of oxygen have been kept in an active state for 35 days as compared with the normal in vitro life of a few hours. The Na salts of glutathione, thioglycollic acid and ascorbic acid (all buffered at pH 7) preserved the virus against rapid aerobic inactivation. Epinephrin had no significant effect on the activity of suspensions exposed to air, but protected the virus against the slow inactivation which takes place in the absence of oxygen. Redox potentials of the test systems are recorded and discussed in relation to the relative efficiencies of the protective agents.—R. J. Best.

8609. CLINCH, PHYLLIS, J. B. LOUGHNANE, and PAUL A. MURPHY. A study of the infiltration of viruses into seed potato stocks in the field. Sci. Proc. Roy. Dublin Soc. 22(2): 17-31. 1938.—Studies were made on the virus content of various lots of potatoes of the varieties Champion and Arran Banner. In the first studies, tests were made on 4 lots of Champion and 5 lots of Arran Banner, all derived from 2 stocks believed to be virus-free in 1923, and since then grown in the field in County Donegal in various degrees

of isolation for 5-7 years. Virus X infection was found present in all lots; the infection in Champion varied from 40 to 60% and in Arran Banner from 38 to 94%. Virus A occurred in 3 lots to the extent of 2 to 6% in Arran Banner, in 3 lots to the extent of 4%, these being accompanied by X in all cases. No other virus was present. Tests were also made of 7 lots of the var. Champion, all descended from stock known to be virus-free in 1931 and propagated since then in County Donegal. After being grown in moderate commercial isolation in the field for 4-6 years, each of the 7 lots showed complete freedom from virus X, A, Y (Solanum virus 2), G (S. virus 9), E (S. virus 7), F (S. virus 8), and leaf roll. The writers concluded that in the absence of initial infection within a crop, it is possible to maintain potato stocks free from virus X and other similar viruses by moderate commercial isolation in a district like County Donegal, where insect vectors are scarce.—J. H. Jensen.

8610. FAWCETT, G. L. La psorosis en los naranjos de Tucuman. [Psorosis of oranges of Tucuman.] Rev. Indust. y Agric. Tucuman 28(4/6): 101-103. 2 fig. 1938.—Psorosis has been found in the orange groves of Tucuman, and its incidence is increasing. The most distinctive symptom is the rough appearance of the bark which is broken into small areas that adhere to the trunk. In advanced stages the trees dry slowly and lose their leaves. A mottled condition of the leaves may occur, and gum sometimes forms in the cracks of the bark. Although young trees seem to be affected, the disease is not manifest until the 6th year or later. It is especially severe on the sweet orange, but no species or var. seems to be immune. The disease seems to be transmitted by the use of diseased scions and buds. Cure can be effected by scraping away all affected bark, and for about 10 cm beyond, then treating the area with an antiseptic.—J. W. Gilmore.

8611. LOUGHNANE, J. B., and PAUL A. MURPHY. Dissemination of potato viruses X and F by leaf contact. Sci. Proc. Roy. Dublin Soc. 22(1): 1-15. 1938.—Potato virus X was contracted readily by potato plants growing in an insect-proof greenhouse or in the field when leaf contact was obtained with plants infected with virus X. A greater incidence of infection was obtained by increasing leaf contact through the use of an electric fan. No infection took place through the roots, even when diseased and healthy plants grew in the same pot. Potato virus F was transmitted by leaf contact in the plant house under the same conditions as virus X. A case is recorded of the accidental transmission of such Up-to-Date streak (virus B or X + B) in a plant house, presumably by leaf contact.—J. H. Jensen.

8612. MANIL, P. Inactivation partiellement réversible, par HgCl₂, du virus appelé "tobacco necrosis." Compt. Rend. Soc. Biol. 127(14): 1464-1467. 1938.—The virus resists large doses of HgCl₂. HgCl₂-inactivation of the virus is partially reversible if the Hg⁺⁺ is precipitated. The mechanism of reactivation is unkonwn: it may be chemical dissociation or a physical phenomenon as in the case of the resuspension of a substance after coagulation by HgCl₂.—J. T. Myers.

8613. PFANKUCH, E., und G. A. KAUSCHE. Über Darstellung, Eigenschaften und quantitative Bestimmung von Tabakmosaik-Virus und Kartoffel-X-Virus und ihre physikochemische Differenzierung. Biochem. Zeitschr. 299 (5/6): 334-345. 4 fig. 1938.—A method was described for concentrating the tobacco-mosaic (TM) virus and the potato-X (X) virus using (NH4)2804 precipitation. The specific turbidity and specific extinction of the X-virus were much higher than those of the TM-virus. In 25% saturated (NH4)2804 the turbidity of the TM-virus was maximum, while the X-virus soln. showed no increase in turbidity. The degree of purity of the preparations could be followed with the gold sol reaction.—J. M. Little.

8614. SMITH, J. HENDERSON. Some recent developments in virus research. Ann. Appl. Biol. 25(2): 227-243. 1938.

8615. SMITH, K. M. The study of plant viruses with special reference to their insect-relationships and some comparisons with the animal viruses. Trans. Roy. Soc. Trop. Med. and Hyg. 32(5): 557-566. 5 fig. 1939.—Of the more than 163 plant viruses known, the majority are trans-

ferred by insect vectors, mainly Homoptera and thrips; all sucking insects. The peach aphid (Myzus persicae) alone transmits 21 virus diseases. The virus must pass through the intestinal wall of the insect before it enters the salivary glands and causes the insect to become a vector. Animal viruses may multiply within an insect vector, but plant viruses probably do not do so, and this seems to indicate that animal viruses are more intimately bound up with the metabolism of the vector. Viruses picked up by larvae may continue into the adult form, and even into the 2d and 3d generations; thus vectors may inherit the virus for considerable lengths of time. Many insects may carry viruses, but are not vectors since they can not transmit the virus to a host plant.—A. C. Walton.

considerable lengths of time. Many insects may carry viruses, but are not vectors since they can not transmit the virus to a host plant.—A. C. Walton.

8616. TOMPKINS, C. M. A mosaic disease of turnip. Jour. Agric. Res. 57(8): 589-602. 4 fig. 1938.—This new mosaic disease of turnip, prevalent on Long Island, New York, is characterized by coarse vein clearing of the leaves in early stages of infection, followed by conspicuous mottling with raised islands and crinkling, and stunting of whole plants. In the greenhouse the virus was readily transmitted by Myzus persicae and Brevicoryne brassicae, and also by mechanical inoculation using carborundum as an abrasive. The incubation period was 13-21 days. The virus was active at the end of 2 days but not after aging for 3 days at 22°C. Its inactivation temp. lies between 60° and 63°. A tolerance to dilution of 1 to 3,000 was established. The host range includes 18 spp. of plants representing 12 genera in 6 families; 11 spp. belong to the Cruciferae, including cabbage, cauliflower, rutabaga, leaf or Chinese mustard, pe-tsai, annual stock (Matthola), Dames violet (Hesperis), Virginian stock (Malcomia), honesty (Lunaria), and Chinese radish.—C. M. Tompkins.

NON-PARASITIC DISEASES

8617. BENNETT, F. T., and L. E. EDNEY. "Brown Heart" of Swedes. Jour. Min. Agric. [Gr. Brit.] 45(12): 1232-1239. 1939.—Brown heart of rutabagas and turnips was first observed in Ireland about 1913. It is now prevalent in Cumberland and occurs in other parts of England. In Scotland it is known as "raan." The disease is now recognized as being due to a deficiency of boron. The symptoms are described minutely. Control expts. are reported in which brown heart was prevented by application of 20 lb. of borax per acre, using basic slag or sand as a mixer. The increasing prevalence of brown heart is attributed to the use of artificial fertilizers in place of stable manure, and to the practise of liming or applying basic slag. The recommended rate of application of borax will also prevent heart rot in mangolds and sugar beets.

8618. CAMP, A. F. Symptomology of deficiencies and toxicities of citrus. Proc. Ann. Meet. Florida State Hort. Soc. 51: 145-150. 1938.—The 4 deficiencies discussed are those of Zn, Cu, Mn, and Mg, the toxicity that of B. The symptoms are treated under three heads, foliage, growth, and fruit. In common usage Zn deficiency is spoken of as "frenching," Cu deficiency as "dieback" or "ammoniation," Mg deficiency as "bronzing." Mn deficiency often resembles 2n "frenching," although in foliage effects the color produced is more often a dull slate cast, rather than yellowish. Where 2 deficiencies occur simultaneously, the symptoms of one may mask the effects of the other. B toxicity does not occur from naturally occurring B in the soil but usually from the dumping of borax-containing wash water from packing house tanks or of borax treated culls or cannery waste in citrus groves.—T. R. Robinson.

8619. DEMETRIADES, S. Y a-t-il une chlorose par excès de fer? Rev. Gén. Bot. 50(592): 181-202. 6 fig. 1938.— Marsh and Shive had found, with soy bean, that chlorosis may result both from insufficiency and from excess of Fe, the limits of conc. which produce a good growth being narrow. Expts. with Dolichus sinensis, Vitis vinijera var. sultanina, and Evonymus pulchellus show that excessive doses of iron sulphate do not produce chlorosis, even though they may cause shrivelling of roots and eventual death of the plant; the limits of Fe conc. in the soil are not very narrow and there seems to be no chlorosis due to excess of Fe.—R. Bentall.

8620. FUDGE, B. R. Magnesium deficiency in relation to

yield and chemical composition of seedy and commercially seedless varieties of grapefruit. Proc. Ann. Meet. Florida State Hort. Soc. 51: 34-43. 1938.—It has long been noted that the foliage of seedy vars. of grapefruit is subject to bronzing as the fruit reaches maturity. This condition is often referred to as "crop strain." The Marsh (seedless) var. is usually free from this leaf bronzing. Analyses of whole fruit, seed, and foliage of seedy and (nearly) seedless vars. showed that the bronzed leaf condition was closely associated with Mg deficiency and that the production of large quantities of seeds in seedy vars. is one of the factors augmenting this deficiency.—T. R. Robinson.

8621. JONES, LINUS H. Relation of soil temperature to

8621. JONES, LINUS H. Relation of soil temperature to chlorosis of gardenia. Jour. Agric. Res. 57(8): 611-621. 2 fig. 1938.—In expts. with a constant soil-temp. apparatus, a chlorosis of gardenia could be induced at a soil temp. of 18°C or less. No chlorosis was obtained when the soil temp. was maintained at 24°C or above. If the soil temp. of a chlorotic plant was raised to 24°C, or above, normal green color gradually replaced the chlorotic condition, by slowly appearing in the top leaves and working down the stem to lower leaves. Chem. analyses did not show the absence of a necessary element. Size of leaf and rate of growth were affected by soil temp. and not air temp. Wilting was caused by a sudden lowering of soil temp. and at 8° and 10°C a rapid senescence of the oldest leaves occurred. Vegetative growth and reproductive development could be altered at will by soil temp. control.—L. H. Jones.

will by soil temp. control.—L. H. Jones.

8622. YENDO, YASUTARO, and TOSIO HARA. The cause of chlorosis of the mulberry tree in some districts of Toyama Prefecture. Bull. Sericult. and Silk-Indust. [Japan] (Sanshi-Gaku Zasshi) 11(1): 1-14. 1938.—Chlorosis is found in every var. of mulberry and also in Cryptomeria japonica and Kraunhia floribunda, in Toyama Prefecture, Japan. The symptoms are yellowing of full grown leaves and failure of young leaves and shoots to reach maturity, but the leaves do not curl or crinkle as in mosaic diseases, and there is no evidence of a virus. The disease appears to be caused by excessive Ca in the soil, microscopic examination of which reveals numerous skeletons of protozoa, spicules of sponges, etc., which may be the source of the Ca.—C. S. Gibbs.

PARASITISM AND RESISTANCE

8623. BROADFOOT, W. C., and L. E. TYNER. Studies on foot and root rot of wheat. V. The relation of phosphorus, potassium, nitrogen, and calcium nutrition to the foot- and root-rot disease of wheat caused by Helminthosporium sativum P. K. and B. Canadian Jour. Res. Sec. C, Bot. Sci. 16(3): 125-134.1 pl., 1 fig. 1938.—Wheat grains were planted in sterilized pure quartz sand to which the necessary nutrients and a spore suspension of the pathogen were added. The exps. were maintained under aseptic conditions during the first 10 days. The disease increased when the ionic conc. of K, N, and Ca was decreased below that of the complete nutrient soln., but no significant reduction of the disease was observed when the concs. of all of the elements, including P, were increased above those in the complete nutrient soln. Apparently extremely small concs. of P had no effect on the disease. These conclusions apply to the disease on the seedling stage of wheat.—Auth. abst.

8624. GIBELLI, CAMILLO. Sul potere immunizzante delle piante. Arch. Internat. Pharmacodyn. et Thér. 60(4):

8624. GIBELLI, CAMILLO. Sul potere immunizzante delle piante. Arch. Internat. Pharmacodyn. et Thér. 60(4): 410-422. 1938.—Cryptogamic and phanaerogamic plants grown upon media inoculated with Escherichia coli or Bacillus pyocyaneus can attenuate or inhibit toxic actions of the micro-organisms, but do not destroy their vitality. The plant does not have antitoxic properties, but imparts them to the media, from which it may draw them. The plant is rendered immune by this interchange. Thus, animals may consume plants grown on infected soil, without danger. The immune process is non-specific, and consists of a preventive sterilization of the media. The plant as a whole participates in this action; the neutralizing property is not a property of the roots alone. The antitoxic action may be linked with the normal metabolism of the plant, or by the formation of pseudo-antibodies. Effects of Penicillium glaucum and lupine growth in media containing diphtheria toxin were studied for the major part of the work.—G. A. E.

8625. STRONG, M. C. A new Fusarium-wilt-resistant tomato. Quart. Bull. Michigan Agric. Exp. Sta. 21(3): 164-169. 2 fig. 1939.—An account of the origin and history and a description of a strain of the John Baer tomato. Selection was based on resistance to wilt when plants were grown in soil artificially infested with 50 isolates of Fusarium lycopersici.—V. R. Gardner.

DISEASE CONTROL

8626. CROSIER, WILLARD, and STEWART PATRICK. Chemical elimination of saprophytes during laboratory germination of seed peas. Jour. Agric. Res. 58(6): 397-422. 1939.—Dusts containing Hg compounds controlled surface molds on pea seeds without injuring the seedlings. Ceresan often increased the size and weight of the seedlings as well as significantly raising the germination percentages. Cu and Zn compounds were less efficient fungicides and prevented normal radicle elongation. Sulphur, aldehydes and ferrous sulphate did not reduce fungus-seed associations. Dip treatments with soluble Hg compounds eliminated molds as well as did dust applications and effected a saving in time and material. Concs. of 0.18% New Ceresan or 0.18% HgClx were optimum dosages. Non-soluble Hg, Cu and Zn compounds did not give a uniform coverage of the seeds. Alternaria spp., Fusarium spp., and Rhizoctonia solani were tolerant of the chemicals studied. New Ceresan caused a slight reduction in Ascochyta pisi growths from infected peas.—Authors.

8627. HORSFALL, JAMES G., and A. L. HARRISON. Effect of bordeaux mixture and its various elements on transpiration. Jour. Agric. Res. 58(6): 423-443. 1 fig. 1939.—
Transpiration of bean plants in the greenhouse was measured daily with auto-irrigators, was calculated on the basis of leaf area, and was expressed as transpiration difference (sprayed minus nonsprayed). High temp. on spray date and the presence of water favored, but high temp. afterwards did not affect, bordeaux transpiration. Cu when rendered soluble at about pH 7 had little effect, both acid and alkaline materials accelerated, and oil reduced transpiration. The alkalinity of bordeaux probably saponifies the cuticle and decreases its resistance to water loss. Desiccation of cut shoots can be used to measure the cuticular effect of sprays. Transpiration from potted plants represents the summation of cuticular and stomatal effects. Increasing spray load increases desiccation but generally decreases transpiration presumably because more water is saved by

stranspiration presumably because more water is saved by stomatal plugging than is lost through the cuticle.—Authors.

8628. PARK, MALCOLM. Citrus canker and its control. Trop. Agric. [Ceylon] 90(3): 127-135. 1 col. pl. 1938.—Citrus canker is one of the most serious diseases of citrus trees in Ceylon and has been present for many years. It is most common at elevations below 3000 ft. but is found at over 5000 ft. It is found on almost all spp., but grapefruit and lime are most susceptible. The disease is sometimes associated with the injury caused by the leaf-mining caterpillar, Phyllocnistis citrella. Complete eradication would be difficult, because the wild Citrus hystrix in the jungles is susceptible. When an infected tree is found it should not be touched but should be burned immediately on the spot. Where prevalent it is best to replace the grapefruits and limes by the less susceptible mandarin orange, sweet orange, or lemon. To prevent wind dissemination of the spores, windbreaks should be planted. Regular picking of infected leaves and excising infected stems, spraying often with a combined fungicide-insecticide, colloidal sulphur or lime-sulphur and nicotine sulphate will protect young developing foliage.—W. D. Pierce.

8629. PARK, MALCOLM, and M. FERNANDO. Some studies on tobacco diseases in Ceylon. 3. The effect of the time of spraying and of the nature of the fungicide on the control of frog-eye (Cercospora nicotianae E. & E.). 4. The economics of field-spraying for the control of frog-eye (Cercospora nicotianae E. & E.). Trop. Agric. [Ceylon] 90 (6): 323-347. 1 pl., 4 fig. 1938.—In tests of spraying with 3 colloidal coppers, a copper emulsion and ammoniacal copper emulsion, all gave increased yield over the checks, and the average quality of the cured tobacco was higher with the sprayed leaf. Spraying during a period of rapid extension of leaf surface is of little value, as new unprotected

tissue is being continually exposed to infection. Two spray-

ings at intervals of a fortnight would give better control than a single spraying.—W. D. Pierce.

8630. WOLF, F. A., J. A. PINCKARD, F. R. DARKIS, RUTH McLEAN, and P. M. GROSS. Field studies on concentration of benzol vapors as used to control downy mildew of tobacco. *Phytopath*. 29(2): 103-120. 3 fig. 1939.—Downy mildew may be completely prevented if benzol fumigation is initiated prior to the outbreak of the disease and is continued throughout the epidemic. If treatment is begun after the outbreak, further progress of infection may be checked. Even when amts, of benzol lethal to the pathogen are applied it becomes difficult to injure tobacco seedlings under field conditions, since the limits of toxicity of benzol to the parasite and to the host are widely separated. The volumepercentage concs. of benzol vapors in the atmosphere of seed beds that are toxic to the pathogen and of those causing injury to tobacco seedlings agree closely with values previously established from laboratory studies. Among the factors that influence the effectiveness of fumigation with benzol as measured by vapor cones. are (a) amount of benzol applied per unit area of seed bed, (b) ratio between area of evaporators and area of seed bed, (c) porosity and penetrability of the covers as modified by their texture and by rain or dew on the covers, (d) rate of volatilization, as modified by temp. and as retarded by mixing lubricating oil with benzol, and (e) presence of water on the foliage of the seedlings. Some of these factors are difficultly separable, but attempts were made to evaluate each one. Moisture on the covers and on the seedlings constitutes the most essential condition in the effective use of benzol in seed beds.—F. A. Wolf.

MISCELLANEOUS

8631. CHILDS, THOMAS W., and J. W. KIMMEY. Studies on probable damage by blister rust in some representative stands of young western white pine. Jour. Agric. Res. 57(8): 557-568. 1938.—Data were taken from 5,454 infected trees, representing 3 stands in British Columbia and 5 in Idaho. Calculations were made of the probable ultimate effect of each of 21,303 cankers on its host. The % of cankers capable of damage ranged from nearly 100 in the smallest trees to less than 30 in trees 45-50 ft. tall, but the

larger trees (up to 40 ft. in height) become much more heavily infected than do small trees in the same stand and are consequently more liable to damage. Within a given height class, the % of cankers capable of damage and the length of time required for such damage to occur may vary, depending on crown width, rate at which branches are being killed by suppression, and other factors. Although complete destruction of extensive young stands can occur only when enormous numbers of cankers are present, serious damage may result from relatively few cankers, and stands exposed to even moderately severe infection will be practically destroyed before becoming commercially mature.—T. W. Childs.

8632. MOLISCH, H. Der Einfluss einer Pflanze auf die

Andere. Allelopathie. 106p. G. Fischer: Jena, 1937.

8633. WORMALD, H. Diseases of fruits and hops. With a foreword by G. H. PETHYBRIDGE. 290p. illus. Crosby Lockwood and Son, Ltd.: London, 1939. Pr. 17s. 6d.—Although written primarily as a growers' handbook, for British conditions, on the identification and control of the diseases (fungus, bacterial, virus, and physiological) which diseases fruits and hops this book will also serve the needs of affect fruits and hops, this book will also serve the needs of students and advisers for a concise, up-to-date summary in horticultural pathology. The text includes the following chapters: 1. Factors conducive to health or disease in plants; 2. Fungicides and their application; 3. Diseases affecting a number of host plants; 4 to 14. Diseases of apple and other pome fruits, stone fruits, currant and gooseberry, brambles, strawberry, grape, fig, mulberry, and nuts; 15. Important diseases not yet recorded in Britain; and indexes to popular and scientific names, and to authors. Chap. 3 covers crown gall, root rot (Armillaria, Rosellinia), wilt (Verticillium), coral spot (Nectria), silver leaf (Stereum), brown rot (Sclerotinia), gray mold (Botrytis), bacteriosis of stone fruits, and functional disorders such as leaf scorch and chlorosis. Two chapters are devoted to apple diseases, covering respectively the tree and the fruit, the latter including storage disorders. A useful aid to the reader is the conspectus preceding each chapter which classifies the subject matter as to the part of the plant affected—root, stem and branches, foliage, flower buds and fruit; and also furnishes a key to the etiological agent and an index to the page of treatment.—F. Weiss.

ECOLOGY

Editors

 W. C. ALLEE, General Animal Ecology
 G. D. FULLER, General Plant Ecology
 CHANCEY JUDAY, Hydrobiology (Oceanography, Limnology) FREDERICK A. DAVIDSON, Ecology of Wildlife Management—Aquatic W. L. McATEE, Ecology of Wildlife Management— Terrestrial

(See also in this issue Entries [GENERAL AND ANIMAL ECOLOGY]: Communities—ants and men, 8871; Animal behavior, 8883; Dictionary, 8896; Evolution of parasitic habit, 8899; Genetics of wild Drosophila populations, 8948; Disease and environment, 10008; Entomophily in Osmanthus, 10144; Wireworm population studies, 10410; Population density and reproductive rate in Paramecium, 10519; Rhizopods of Lappland, 10526; Adaptations in muscles, 10560; Zoogeography of Ostracod, 10569; Life cycles of carabid beetles, 10593; Adaptation in leaf-cutting beetle, 10594; Flower-eating birds, 10649; Mammals of Idaho, 10659: Ecology of body color in deer-mice, 10664. [PLANT ECOLOGY]: Agropyron, 10122; Geographic factors in plant speciation, 10158; Life zones of Greenland, 10162; Pollination in Vallisneria, 10168; Rôle of root reserves in persistence of perennial weeds, 10176; Competition for soil water—maize vs. Convolvulus, 10177; Selenium indicator plants and seleniferous areas of U. S., 10179; Factors affecting prevalence of Trifolium repens, 10180; Grassland agriculture, 10181; Grazing and pasture management in Kenya, 10189; Grasses susceptible to grasshopper attack, 10191; Temp. and humidity as affecting seed viability, Festuca, 10193; Soil conservation and crop rotation, Washington (State), 10199; Wild erosion in field and soil drift expts., 10204; Forest sites, Bioclimatics, 10238; Pine and Spruce, 10243; Afforestation on water-wasted soils, 10245; Reforestations and succession in Brazil, 10246; Root competition, 10257; Root competition and silviculture, 10278; Damping-off disease as edaphic limiting factor for pines, 10352)

GENERAL

8976. ALLEE, W. C. The social life of animals. 293p. W. W. Norton: New York, 1938. Pr. \$3.00. 265p. Heinemann: London, 1938. Pr. 12s. 6d.—This book presents in non-technical language the general framework of group biology with reference to the beginnings of social life. It might more appropriately have been called the biological background of cooperation. In a general way the literature dealing with animal aggregations is brought up to date. Attention is paid to the rôle of numbers of organisms in various aspects of population physiology including social facilitation, group organization and even general evolution. Indications are given of the relations between laboratory and natural populations and between aggregations and truly social life. A chapter on human implications is an integral part of the discussion. There is a brief bibliography and an index.—W. C. Allee.

8977. SCHNEIDER, F. Ein Vergleich von Urwald und Monokultur in Bezug auf ihre Gefährdung durch phytophage Insekten, auf Grund einiger Beobachtungen an der Ostküste von Sumatra. Schweiz. Zeitschr. Forstwesen 90(2): 41-55; (3): 82-89. 11 fig. 1939.—The natural balance of numerous spp. of plants and animals, particularly insects, in tropical forests is illustrated by the mutual relation between the populations of Oreta carnea, which defoliates gambier (Uncaria gambir), and its parasites, mainly Brachymeria euploeae. In virgin forest, there are many spp. of phytophagous insects, as well as parasites and predators; each phytophagous insect has several insect enemies, and each plant sp. is host to several insect spp.; each sp. of parasite or predator preys upon several host insects. These conditions are favorable for the parasites; the combined effect of all of them tends to prevent serious outbreaks of the hosts. Extensive monocultures create conditions unfavorable for many phytophagous insects, but highly favorable for some of them. Parasites, reduced to the necessity of depending on one or a

faw host spp., are unable to maintain the balance between host and parasite.—W. N. Sparhawk.

8978. TAEUBER, CONRAD. Agriculture and current population trends. Proc. Amer. Phil. Soc. 80(4): 477-489. 1939.—Although the total population of the U. S. has increased by 33% since 1910, the proportion of this population living on farms has decreased 25%. The absolute number of people living on farms is about stationary. But this farm population, at the 1930 census, was reproducing itself at a rate 69% above its replacement rate, per generation. The farm population, including \(\frac{1}{2}\) of the total population, contributed (in 1930) \(\frac{1}{3}\) of the nation's births, and accounted for \(\frac{1}{2}\) of the annual population increase. In consequence, extensive emigration from the farms to villages, towns, and eities is the rule. This paper, read in Nov., 1938, in a symposium on population growth, summarizes what is known about the trends of our agricultural population, and discusses the differential rates of reproduction among various portions of the farm population—negro, native white, and foreign-born white; southerners, northerners, and westerners;

those with higher incomes and those with lower; those with higher standards of living and those with lower standards; those with a self-sufficing economy and those with a commercial point-of-view. No single factor seems to account for the variations in reproductive rates among these various groups, but the author is especially interested in following the clue provided by the agricultural objectives of the people, i.e., whether they are mercantile or self-sufficing.— F. W. Appel.

BIOCLIMATICS, BIOMETEOROLOGY

(See also in this issue Entries 10038, 10232, 10238, 10320, 10321, 10450, 10497, 10506, 10510)

8979. BAYER, A. W., and J. R. H. COUTTS. Morning and midday relative humidities at Pietermaritzburg, South Africa. S. African Jour. Sci. 35: 154-157. 1939.—Readings for the period June 1, 1937 to May 31, 1938 show: A comparatively low mean midday relative humidity of 50%, which is 24% less than the mean morning humidity; a record of relative humidity as low as 5%; that midday relative humidity may be as much as 69% below morning humidity of the same day; and that the differences in morning and midday relative humidity may or may not be accompanied by changes in the absolute amt. of water vapor in the atmosphere.

mosphere.—A. W. Bayer.

8980. BÜTTNER, KONRAD. Probleme der kosmischen Physik. Vol. 18. Physikalische Bioklimatologie. v +155p. 37 fig. Akademische Verlagsgesellschaft: Leipzig, 1938. Pr. 840M.—The book summarizes the results of investigations and can serve as introduction into the border field between climatology and human biology. The matter is dealt with under the 2 main headings of radiation and heat balance. The former, with 163 references, deals with solar radiation and its transformation in the atmosphere, with special emphasis on the ultra-violet part of the spectrum. The instruments for measuring radiation are mentioned. The response of the human skin to u.-v., and u.-v.-dosimetry, is broadly discussed. Valuable are the numerous graphs and tables with measurements and variations of u.-v. The 2d part, with 92 references, discusses the heat regulatory system of the human body, energy transformations, heat transfer between body and environment, skin temp., cooling power and physical measurements thereof, formulae for comfort zone, and effect of clothing. The present knowledge is critically reviewed throughout and the open questions are discussed, valuable suggestions for future work being given.—H. Landsberg.

given.—H. Landsberg.

8981. EVANS, MORGAN W. Relation of latitude to certain phases of the growth of timothy. Amer. Jour. Bot. 26(4): 212-218. 1 fig. 1939.—Plants of 9 selections of Phleum pratense, ranging from very early to very late, were grown at each one of 10 stations located at intervals extending from Gainesville, Florida, U. S. A., to Fort Vermilion, Alberta, Canada. In the south, selections which were progressively later had progressively shorter stems; in the north, the stems of the later selections grew to as great, or

even greater lengths than those of the early selections. For the earliest selections, the season for blooming progressed from south to north; for the latest selections, blooming occurred first at some mid-latitude, and then progressed both toward the north and toward the south. At a northern station, both early and late selections produced relatively large yields; at a southern station, late selections produced smaller yields than early selections.—M. W. Evans.

8982. HOPE, E. C. Weather and crop history in western Canada. Canadian Soc. Tech. Agric. Rev. 1938(16): 347,358. 2 fig. 1938.—From the data presented there appear to have been 2 definite, long periods of drought in western Canada, viz, 1885-96 and 1929-37, with a possible 3d from 1838 to 1848. Between 1862 and 1868 there were 4 very dry years in Manitoba, and from 1917 to 1921 there was a dry period over most of western Canada. The period of the 70's and early 80's was probably the wettest period in western Canada for over a century. Serious grasshopper outbreaks occurred in 1818-20, 1857-58, 1864-68, 1874-75, 1920-22, and 1931-37. A tabulated chronological summary of weather and crop history in this section is presented (1813-1937).—Courtesy Exp. Sta. Rec.

8983. LIST, GEORGE M. The effects of some low temperatures on the oystershell scale, Lepidosaphes ulmi Linne. Jour. Colorado-Wyoming Acad. Sci. 2(5): 36. 1939.—Midwinter scales were exposed to temps, ranging from 7.5 to -40° F in steps of 2.5° for 2 hrs. Of the control 2.8% failed to hatch. Temps, above -22.5 F produced no definite reduction in hatching. Approximate failures were -25°F, 17%; -30°, 50%; -35°, 70%; -37.5°, 98% and -40°, 17%; -30°, 50%; 100%.—E. D. Crabb.

8984. LIST, GEORGE M. The effect of temperature upon egg deposition, egg hatch and nymphal development of Paratrioza cockerelli (Sulc). Jour. Econ. Ent. 32(1): 30-36. 1939.—Under controlled temps. the species throve best at about 80° F. 70° was more favorable than 90°. Oviposition, hatching and survival were reduced under 90° constant. temp.; 95° for only 2 and 3 hrs. per day permitted little increase in numbers. 100° for only 1 and 2 hrs. per day was lethal to eggs and nymphs and practically stopped egg laying. These results may explain the continued building up of populations throughout the season in the high-altitude cool areas of the State and for the great reduction in numbers during the mid-season, often below the point of injury in certain areas where temps. of 95° and above occur. High temps may cause the adults to take flight. Trapping records taken during 3 seasons in the Grand Valley, Colorado, indicate that at least a considerable part of the spring infestation for that area comes through migrations. The adults were thought to be from spring breeding grounds and they were taken at a time when the populations in warm southern breeding areas were rapidly decreasing.—G. M. List.

8985. MARSHALL, G. E., and M. S. TROTH. The reciprocal of rainfall and temperature as it affects the apple crop. Trans. Indiana Hort. Soc. 1937: 123-129. 4 fig. 1937 (1938).—Drought years occur more or less regularly in 10-yr. cycles, and reference is made especially to such a period since 1930. With regard to the apple crop, it is claimed that a drought is seldom of itself destructive to such deep-rooted trees, but that great damage may result if it is accompanied by excessive temps., and especially when high wind velocity is a concomitant factor. Charts indicate the rainfall of the last 10 yrs. and during the growing season for each of 8 yrs. in Indiana. Summarized climatic data are presented to indicate some of the reasons why orchards were so severely

damaged in 1936.—Courtesy Exp. Sta. Rec.

8986. MATHESON, M. A comparison of various field ecological light measuring instruments and a further contribution to our knowledge of the Eder-Hecht photometer and the Livingston radio atmometer. S. African Jour. Sci. 35: 263-273. 1939.—The Eder-Hecht photometer, the Livingston Radio-Atmometer, the Weston Photronic cell and the Solar Radiation Thermometer are discussed. A Callendar's Pyrheliometer was used as a standard of comparison. The Livingston Radio-Atmometer and the Solar Radiation Thermometer were found to be unreliable instruments even for rough estimates of light intensity. The Westron Photronic Cell and the Eder-Hecht Photometer are the most efficient instruments for field work. As rough ecological instruments these will yield useful data, only if their limitations are realized and the readings carefully interpreted.-M. Matheson.

8987. MILLS, C. A. Climate and metabolic stress. Amer. Jour. Hyg. Sect. A 29(3): 147-164. 1939.—A critical survey of the available literature reveals a clear inverse relationship between prevailing mean environmental temp. level and resting combustion rate in man of middle temperate regions. Evidences of metabolic stress show up in the mortality and morbidity statistics of those diseases directly concerned with combustion processes, red cell production, and oxygen transportation by the circulatory system. Diseases found most concerned in this climatic stress are diabetes, toxic goiter, pernicious anemia, Addison's disease, and arteriosclerotic failure of the circulatory system. People living in the upper half of the Mississippi river basin (particularly in the Plains states from Kansas northward) show the most alarming evidences of this stress. It is even more pronounced among negroes than the white race. Urbanization seems definitely to accentuate the stress, although the metabolic breakdown and vascular failure are practically as severe in cities of 2500 to 1000 population as in the largest urban centers. The findings, as set forth, seem to provide a common etiologic factor for the diseases of metabolic breakdown and circulatory failure mentioned above. This factor is basically climatic, related to the ease of body heat loss, but its effects seem greatly accentuated by the added stress of urban unrest. -C. A. Mills.

8988. SARGENT, FREDERICK. Studies in the meteorology of upper-respiratory infections. I. Bull. Amer. Meteorol. Soc. 19(9): 385-391. 1938.—An analysis of the influence of the daily meteorological environment on the daily course of respiratory infections at the Phillips Exeter Academy, Exeter, New Hampshire, revealed the fact that the onset of the clinical symptoms of these infections is in part de-pendent on the weather. The inbreak of the cold air and the following period of cold dry air proved to be the affective meteorological situations. Barometric pressure and barometric variability offered the most consistent indicies of the weather state for biometeorological studies. A seasonal shift in the onset time of respiratory infections with respect to the cold front was observed during the 3 yr. period of the investigation from Sept., 1935 through June, 1938.—F.

8989. TURNAGE, WILLIAM V. Desert subsoil temperatures. Soil Sci. 47(3): 195-199. 1939.—The use of permanently installed thermocouples to obtain soil temp. readings at depths of 3, 6, and 12 feet in a typical desert soil is described. The mean annual temps, at all depths are higher than the mean air temp. Subsoil temps. in a desert are more complacent than those of non-desert regions, and

are always above the minimum for root growth of most desert plants.—W. V. Turnage.

8990. VISHER, S. S. Rainfall-intensity contrasts in Indiana—causes and consequences. Geogr. Rev. 28(4): 627-637. 18 fig. 1938.—In this account the author discusses the advantages of Indiana for such a study, the aspects of rainfall-intensity studies, intensity contrasts revealed by other maps, causes for the contrasts in rainfall intensity, some apparent effects of the intensity contrasts, and rainfall intensity in relation to crop yields. This study of a sample area indicates significant contrasts in rainfall intensity as existing in a region previously believed to be distinctly uniform climatically. "The correspondence found between the distribution of this fundamental climatic factor and the distribution of various conditions affected by it suggests that similar studies of rainfall-intensity contrasts in other areas might throw light on problems of regional differences."-Courtesy Exp. Sta. Rec.

8991. WHITNEY, LESTER V. Continuous solar radiation measurements in Wisconsin lakes. Trans. Wisconsin Acad. Sci., Arts and Lett. 31: 175-200. 1938.—Thermopiles, Photox cells and a Cambridge recorder were used to obtain continuous records of the quantity of solar radiation that penetrated to different depths in 4 lakes under various conditions of sun, sky and water surface. The continuous records agreed satisfactorily with calculated values, both as to the total change in transmission over the course of the

day and as to the general form of the calculated transmission curve.—C.Juday.

8992. WILSON, J. D. Evaporation studies. III. Ten years of evaporation at Wooster as measured with black and white atmometers. Ohio Agric. Exp. Sta. Bimo. Bull. 24(197): 11-25. 1939.—The 10-year averages showed evaporation to be greatest in July, followed by that of June, August, May, and Sept. in decreasing order. Radiant energy (recorded as B-W) was responsible for 29% of total water loss from black atmometer (B) over the 50-month period. This was 41% of total loss from the white atmometer (W). Rainfall exceeded evaporation in 13 of the 50 months; evaporation exceeded rainfall by at least 50% in 24 months and was at least twice as great in 18. Drouths occurred in 1930, 1932, 1933, 1934, and 1936, and evaporation was above the average in each of these years. 5 of 12 drouths began in May, one in June, 3 in July, and three began in Aug. and continued into Sept. The evaporation pan was more responsive to the radiant energy and temp. factors than were either the black or white atmometers. The mean value of the conversion factor for use in transposing atmometer data to inches of evaporation was 260 and 180 for the black and white instruments, respectively. The average value of an hour of sunshine, in terms of water evaporated from the black atmometer (B-W)/S, was largest in June (1.3 cc.), followed by July, Aug., Sept., and May in that order.—J. D. Wilson.

ANIMAL

8993. ARCHER, ALLAN F. The ecology of the Mollusca of the Edwin S. George Reserve, Livingston County, Michigan. Occas. Papers Mus. Zool. Univ. Michigan 398. 1-24. 1939.—This is a study of the land and freshwater Mollusca of the George Reserve based on the ecological distribution of each species. 27 natural and artificial communities are considered, both land and freshwater, and grouped under aquatic, bog, marsh, sand, fire and clearing successions, as well as artificial and erosion communities. The bog lake community leads all other aquatic communities in the number of spp.; the oak-hickory community leads all other terrestrial communities. Two of the communities created by the clearing of the land also have a large number of species. No species have apparently become extinct because of human activities. The culture zone is characterized by some diminutive spp. of xerophilous tendencies, and the bigger mesophiles are not so numerous or important here as they are under natural woodland cover. The habitudinal distribution of 16 aquatic spp. and 36 terrestrial species is described.—A. F. Archer.

8994. BRUES, CHARLES T. The mimetic resemblance of flies of the genus Systropus to wasps. *Psyche* 46(1): 20-22, 1939

8995. CHAPMAN, ROYAL N. Insect population problems in relation to insect outbreak. Ecol. Monogr. 9(3): 261-269. 1939.—This brief consideration of some of the problems of insect outbreaks indicates that the most important problem is to get critical research done: (1) on the fundamental problems of populations and the causes of their fluctuations, and (2) on the ecology of "outbreak pests" in advance of the outbreaks. This means working on a species of insect at times when it is not thought of as of any economic importance, even though there may be demands for remedial work on another species. The same economic demands which have built up great programs in economic entomology have often prevented or interrupted programs of sustained fundamental research which, in the long run, would give the greatest economic return.—R. N. Chapman.

8996. EMERSON, ALFRED E. Social coordination and the superorganism. Amer. Midland Nat. 21(1): 182-209. 1939.—The animal society is considered a high level of organismic evolution. Significant parallels may be drawn between the organization of lower cellular and multicellular individuals and the social organization of wasp, bee, ant, termite and human societies. A division of labor between the parts is demonstrated. The castes of the social insects are analogized with the cells of the multicellular organism and show division into germinal units and somatic units. Caste differentiation seems to rest upon mechanisms such as those found in cell differentiation, the different castes having the same genetic constitution aside from sexual distinctions.

Organismic patterns similar to the symmetry patterns of multicellular organisms can be shown in the social organism. These patterns are correlated with activity gradients. Regeneration of symmetry patterns as well as replicative parts are also found in the superorganism. Physiological dominance is found in the reactions to the queen. Chemical integration is shown by the "social hormone" determination of castes in termites. The mechanism of phagocytosis in reorganization is duplicated by cannibalism. Colony recognition on a chemical basis parallels tissue reactivity in transplants. The transmission of impulses through the colony resembles nerve conduction and coordination. Daily, seasonal and life cycles in the social organism parallel the periodic cycles of the multicellular organism. Social rejuvenescence and senescence can be demonstrated. The influence of the gene complex upon phylogeny of the superorganism is demonstrated through the transmission of hereditary patterns. Homologies, adaptations, convergence and degeneration are all shown on the superorganismic level. Natural selection of the superorganism as a whole is indicated by the evidence. Adaptive social evolution occurs without the possibility of a Lamarckian mechanism. The superorganism functions through the societal control of the environment of the organism much as the multicellular organism controls the environment of the cell. From both the standpoint of ontogeny and phylogeny, the superorganism parallels the integrative dynamics of the lower levels of organismic individuality. Analogy is freely used as evidence and is not considered superficial when it indicates environmental forces of fundamental importance. Analogy should be used with homology in the analysis and synthesis of scientific principles. The intraspecific superorganism is a high level of biological coordination which gives clues to integrative adjustments and their causes in both lower and higher organizations. Many significant parallels with the interspecific superorganism may also be found which lead directly to the dynamics of the biotic community.—A. E. Emerson.

8997. EMERSON, A. E. Populations of social insects. Ecol. Monogr. 9(3): 289-300. 1 fig. 1939.—The complex interrelationship of factors having an effect upon the population dynamics of social insects (wasps, bees, ants and termites) is diagrammed and discussed. The factors influencing the population complex are divided into the intraspecific societal factors, the interspecific societal factors, and the environmental factors, both physical and biotic. All these factors are divided into those tending to increase the population, those tending to decrease the population, and those with a fluctuating influence upon numbers. Among the many factors, emphasis is placed upon social hormones, fecundity, cannibalism, types of food, predatism, nest-building, and environmental control. The integrated population unit is regarded as the result of natural selection acting upon the group as a whole. Both intraspecific and interspecific groups are considered as objectively real biological units.—A. E. Emerson.

8998. FICHTER, EDSON. An ecological study of Wyoming spruce-fir forest arthropods with special reference to stratification. Ecol. Monogr. 9(2): 183-215.4 fig. 1939.—The Wyoming spruce-fir forest habitat, studied in summer at an altitude of 10,000 ft., shows a measurable stratification of physical environmental factors, detd. in this study for evaporating power of the air only. Evaporation stress increases with elevation above the forest floor, as shown by comparative evaporation rates from atmometers exposed at 0.1 meter, 1 m., and 3 m. Considering the rate of evaporation at the 3-m. level as 100%, the rates at the 0.1-m. level and the 1-m. level were 48.6% and 72.4%, respectively. Stratification of physical factors of the environment, governed by the dominant forest cover (Shelford, 1912), results in a stratification of the arthropod biota as detd. by random sweep collections in the vegetation at these levels, and expressed by the composition and distribution of animal stratal societies. Such groupings are not permanent, even during summer; they show vertical shifts in position and changes in composition in response to vertical shifts in physical factors. They are therefore subordinate. Consecutive weekly evaporation rates exhibited differences as great as 74.6%; rel. humidity records showed a maximum range within a week as great as 67%, a mean range of 49.3%, and

a maximum range of 74.5% for the season; temp. showed max range values as great as 45.4° F within a single week with a mean range value of 33.9° F, and a maximum seasonal range of 49.5° F. These data, collected during July and Aug., provide evidence that pronounced shifts in physical factors do occur in the lower epiphytic strata of the spruce-fir forest at 10,000 feet. Such marked ranges in temp. did not occur in the litter-duff stratum. A prevalent of any stratal society gaining its prevalence through response to physical factors, in part at least, is therefore probably of value as an indicator of immediate environmental conditions. Saprophytic acarines appeared as the prevalent of the litter-duff and the undergrowth strata. Diptera prevailed in the herb-half-shrub stratum, while a homopteran was the prevalent in the low tree stratum. Although biotic factors of the environment undoubtedly exert considerable influence in producing stratification of animal societies, they were not investigated in this study. Complicating the picture of stratal animal societies is the occurrence of seasonal societies, somewhat indicated in the study by the appearance of an aestival high point in total population and in the numbers of prevalent forms, and of an upward trend at the close of the study, suggesting a possible autumnal peak.—Auth. summ.

8999. FROHNE, W. CARRINGTON. Biology of certain subaquatic flies reared from emergent water plants. Papers Michigan Acad. Sci. Arts and Lett. 24(2): 139-147. 1938 (1939).—Some taxonomically remote, large phytophagous Diptera characterize the insect fauna of emergent aquatic plants in the lakes of northern U. S. Apparently by convergent evolution they have assumed similar aquatic adaptations. The species are: (1) Asteromyia phragmites and (2) Hormomyia sp. (Cecidomyiidae). (3) Oligochaetus sp. (Dolichopodidae), (4) Cordylura latifrons (Scatophagidae), (5) Chloropisca sp. and (6) Diplotoxa microcera (Chloropidae). (7) Leucopis griseola (Ochthiphilidae), and (8) Agromyza longipennis (Agromyzidae). Their life histories are noted. These spp. are associated respectively for shelter and food with: Phragmites communis; Carex vesicaria; Eleocharis palustris var. major, Scirpus occidentalis, and S. americanus; the spp. of Scirpus mentioned, and Scirpus validus; all 3 mentioned spp. of Scirpus, S. occidentalis; and S. americanus and S. occidentalis. The following parasitic Hymenoptera were reared: Epiurus sp. (Ichneumonidae) from (1); Leptacis sp. (Platygasteridae) from (2); Aphaereta sp. (Braconidae) from (4); and Dacnusa sp. (Braconidae) from the mine of (3).—W. C. Frohne.

9000. HAMMOND, E. CUYLER. Biological effects of population density in lower organisms. Quart. Rev. Biol. 13(4): 421-438. 1938; 14(1): 35-59. 1939.—Certain elementary benefits from limited crowding of lower organisms may have been a large factor in the original development of the social instinct. In such diverse forms as protozoa, crustaceans, worms, marine and fresh water fish, and amphibians the formation of groups may be a protection against toxic substances dissolved in the liquid medium, the presence of noxious solids, extremes of temp. and other elements of bad environment. On the other hand, severe crowding is almost invariably harmful. The accumulation of metabolic waste products in a liquid medium decreases the longevity, growth and reproductive rate of animals living in it. Other noxious results of crowding are the decreased food supply and the mechanical disturbance of the individual. The effects of certain other environmental factors, particularly temp., on the speed of development, mortality, fecundity, and morphology of Drosophila are also reviewed.—H. G. Swann.

9001. KING, K. M. Population studies of soil insects. Ecol. Monogr. 9(3): 270-288. 1939.—After a brief characterization of soil insects and their environment, the discussion falls into 2 main sections:—a comprehensive critical appraisal, in terms of underlying principles, of methods of sampling for soil insect populations; and an examination of some of the results that have been secured in such study. Although data in support of the ideas expressed are cited but incompletely or only by reference, the opinions and analysis are the development from over 16 years' field work. Population studies afford a procedure of very great practical and scientific potentiality, if properly utilized; and quanti-

tative field study should be complementary with laboratory experimentation, in all biological research.—K. M. King.

9002. MacGINITIE, G. E. Littoral marine communities. Amer. Midland Nat. 21(1): 28-55. 1939.—Marine animal communities are not static affairs. Variation is the most important principle in ecology. Animals can not be pigeon-holed under unit factors. No apparatus yet used is sufficiently efficient to provide a complete picture of ocean bottom communities. Free-living animals migrate greater distances on smooth bottom than on rocky shores. Sand beaches provide habitat for burrowers only, and are rich in food because of the plankton destroyed in the breakers and because of the green algae and bacteria growing on the moist sand between tides. Marine communities are subject to change through cataclasm, migration, old age, and larval settling chance. Dominance, while apparent in some rocky shore communities, fades out in estuaries and ocean bottoms. Using the locality, rather than the generic names of animals. for naming a community is recommended. Dominants may be dominant in entirely different communities, and their use to name a community may cause the worker to make very small community areas. Background on the part of the worker is shown to be more important than in any other branch of biology. Individual life histories of members of the community are necessary to a fuller understanding of the sociology of marine animal communities, for every animal is a part of the environment of the community. -G. E. MacGinitie.

9003. MICHELBACHER, A. E. Seasonal variation in the distribution of two species of Symphyla found in California. Jour. Econ. Ent. 32(1): 53-57. 1939.—Population trends of 2 species of symphylans having markedly different reactions are considered. The garden centipede, Scutigerella immaculata, is very active, and moves readily about in the soil so that its distribution is greatly influenced by such factors as temp., moisture, soil structure and growing vegetation. It is not able to withstand flooding as well as Symphylella subterranea. Symphylella subterranea is more sluggish in its movements and is confined to the lower soil levels which have a rather stable environment. It is apparently little influenced by the above mentioned factors. The lowest symphylan populations are likely to occur during the late winter and early spring and the highest during the summer after the period of heavy reproduction.—A. E. Michelbacher.

9004. SMITH, HARRY SCOTT. Insect populations in relation to biological control. *Ecol. Monogr.* 9(3): 311-320. 1 fig. 1939.—Population densities of insects have static and dynamic aspects. Since the direction and rates of population growth, as seen in cyclic changes, are detd. by births relative to deaths, the % of parasitization may have an important influence on the rate of growth, but it does not determine the mean density from which this growth is measured. No matter what the mean density may be, births and deaths are equal on the avg. and, therefore, the total % of mortality is fixed by the birth rate. The effect of parasitism on the mean population density of a host sp. can be detd. only by studying how the % of parasitization is influenced by changes in the population density of the host sp. Since in sp. which are in equilibrium with their environment only one of the young per parent can reach maturity, the potential reproductive capacity of a parasite cannot have an important influence on the avg. population density of its host. A parasite's power of discovery, combined with certain other environmental factors, determines the level of the host population. Insect predators as a group are less effective than parasites. The effectiveness of an entomophagous insect is influenced by the nature of its host distr. The interaction between specific parasite and host tends to break up a uniform host distr. into small discontinuous units which reach a peak and then decline to near extermination while new colonies are forming in the vicinity.—H. Compere.

9005. STEPHENSON, T. A. The constitution of the intertidal fauna and flora of South Africa. I. Jour. Linn. Soc. [London] Zool. 40: 487-536. 4 pl., 13 fig. 1938.—Summarizes and discusses survey-work done during 1932-1937, by several authors, on the S. African coasts, from Port Nolloth to Durban. The intertidal zone is divided into the following zones, from above downwards (i) Littorina zone (partly supralittoral) in which species of Littorina are

prominent; (ii) Balanoid zone characterized by acorn barnacles and/or Patella granularis; (iii) Cochlear or Argenvillei zones, present only along part of the coast and characterized respectively by dense populations of Patella cochlear and P. argenvillei; and (iv) Sublittoral fringe, in which Laminarian, Ascidian, Zoanthid or Mixed Algal communities tend to dominate. The principal variations in the populations of these zones, around the coast, are indicated. The conceptions of a Littorina zone and of a Sublittoral fringe, and of a Balanoid zone (or of some counterpart) are widely applicable in the intertidal zones of the world; comparisons with British coasts and coral reefs are given. As a detailed example of distr. in S. Africa, an account of the vertical and horizontal distribution of the Patellidae is given.—T. A. Stephenson.

9006. WATSON, J. R., and H. E. BRATLEY. Some ecological notes on the lubberly locust—Romalea micropter Beauv. Florida Ent. 22(2): 31. 1939.—The paper discusses the relation of the soil to the deposition of the eggs and the relation of farms where large numbers of bulbs were grown to the increase of the lubberly locust. The young locusts migrate into these farms from distances of 500-600 ft.—J. R.

Watson.

9007. WELCH, E. V. Insects found on aircraft at Miami, Fla., in 1938. Publ. Health Repts. 54(14): 561-566. 1939.—During the year, 398 incoming Pan American Aircraft from Central America, S. America, the Canal Zone, and Mexico were inspected for the purpose of detecting the presence of live mosquitoes, particularly Aedes aegypti, which might convey yellow fever. 187 planes were found to harbor 486 dead and 166 live insects of various spp. 45 mosquitoes were found on the planes—40 dead and 5 alive. House flies, midges, and gnats were the most prevalent insects recovered. Other insects found were beetles, wasps, ants, moths, cockroaches, chinch-bugs, and stable flies. Two spiders were found on the planes. Precautions were taken by the airways and health authorities for the control of mosquitoes and other insects aboard the aircraft.—E. V. Welch.

PLANT

9008. BAKER, J. R. Rain-forest in Ceylon. Bull. Miscell. Inform. Kew 1938(1): 9-16. 2 pl. 1938.—The Sinharaja Forest, covering 90 sq. miles and situated in the wet (southwest) part of Ceylon, is the only considerable area of virgin tropical rain-forest on the Island. Despite the small climatic changes during the year, the flowering and fruiting is largely seasonal, and some of the largest trees are deciduous. Drip points to leaves or leaflets occur in most of the

species.—J. R. Baker.

9009. BOR, N. L. The vegetation of the Nilgiris. Indian Forester 64(10): 600-609. 1938.—Reference is made to an earlier article (by Mr. Ranganathan) on the subject in which 2 climatic climaxes of such widely divergent life forms, as grassland and forest, were mentioned to co-exist in the Nilgiris against the current accepted views of most ecologists. These views are discussed in some detail, and it is concluded that the Shola forest is the relict of an evergreen forest climax which has been pushed back to its last stronghold by fire and grazing that have rendered stable the grassland which is only a biotic climax.—J. N. Sen Gupta.

9010. CAIN, STANLEY A. The climax and its complexities. Amer. Midland Nat. 21(1): 146-181. 1939.—The complexity of the climax is stated to be due to the gradual nature of change of climatic conditions throughout the range of the climax "type," to the local microclimatic conditions, possibly to the edaphic conditions, to availability of species, and to the ecological amplitudes of species. A discussion of the system and philosophy of Clements is compared with the concepts and methods of plant sociologists with the conclusion that Clements' dynamic interpretation is sound. Many disagreements with Clements' interpretations of vegetation are found to be due to a failure to understand his concepts. Differences between plant sociologists and Clementsian ecologists, and between polyclimax and monoclimax adherents are not as great as terminological differences and methods would indicate. The fundamental difference is found to reside in the contrast between static and dynamic aspects of vegetation and vegetation interpretations. The burden of proof of succession in any particular

case, however, must rest with the "dynamic ecologists" and not be assumed on an hypothecation of a climax.—S. A. Cain.

9011. CONARD, HENRY S. Plant associations on land. Amer. Midland Nat. 21(1): 1-27. 1939.—Paper read at Symposium on plant and animal communities at Cold Spring Harbor Biological Laboratory, Sept. 1938. The Zurich-Montpellier School of Ecology began with Kerner; it is based on stable communities (Hungarian Puszta, beechwoods, spruce forest, mugho pines, alpine vegetation) of central Europe. The Scandinavian School, in a meager marginal vegetation, uses 1-layer communities. The Danish School, following Raunkiaer, uses statistics of life forms, etc. Cowles and Clements in America worked on unstable marginal lands, emphasizing succession. Common bases of investigation and description are desirable. The association concept of the VI Internat. Bot. Congress is adopted. Sample associations are described, selected from literature, from simplest assoc. of Protococcus, through moss assoc., lichen assoc., low vascular-plant assoc., grassland, low forest, high forest, coniferous forest.—H. S. Conard.

9012. DITTMER, H. J. A comparative study of the subterranean members of three field grasses. Science 88(2290): 482. 1938.—A comparative study was made of the roots and root hairs in upper soil levels for oats, winter rye, and Kentucky bluegrass. The last had by far the most extensive underground development, the average soil core 3 in. in diam. and 6 in. long containing 84,500 roots totaling 1,260 ft. in length and 51,600,000 root hairs totaling 32 miles.—Cour-

tesy Exp. Sta. Rec.

9013. EDWARDS, M. V. Effect of burning of slash on soil and succeeding vegetation. Indian Forester 64(7): 438-443. 1938.—The effect of burning slash on soil and succeeding vegetation is discussed from the aspects of effect on mineral constituents of the soil, giving references to work done in several countries. Burning the vegetation returns to the soil all the mineral elements taken out by the plants during life. Burning and the resulting formation of basic ash materials increased the nitrification and resulted in an increase in the soluble mineral constituents of the soil, but destroyed the humus layer. Continuous and repeated burning, however, does not improve forest fertility.—J. N. Sen Gupta.

9014. GLOVER, P. E., and H. J. van RENSBURG. A contribution to the ecology of the Highveld grassland at Frankenwald, in relation to grazing and burning. S. African Jour. Sci. 35: 274-279. 1939.—A set of expts., the "C, D and E Series," was laid out in Dec. 1932. The site chosen was the most homogeneous undisturbed veld available. The object of these expts. was to determine the effects of burning, grazing and trampling on undisturbed veld, over varying periods, and to study changes in plant succession brought about by these treatments. Small plots were used in this instance to test their adequacy, not as replicas of large ones, but as "result indicators" for the management of large plots. Burning in Aug. did not seem to have a detrimental effect on any important grass except Digitaria tricholaenoides. This grass showed a decrease in cover not only in the burnt plots, but also in the control plots. Here the decrease was probably attributable to decreased light intensities owing to rank bunch grasses. Trachypogon plumosus and Tristachya hispida showed a consistent increase in the controls and the C series. They were high up in the sere. Burning and moderate grazing had no adverse effects upon the veld. In series E, the plots which had the longest treatment showed the greatest increase in Cynodon dactylon, and in weeds. The greatest decrease in the original veld grasses occurred here. The treatment resulted in a severe setback to succession.-Authors.

9015. GORRIE, R. M. The conservation of Punjab water supplies. Indian Forester 64(11): 675-687. 1938.—Large parts of the Punjab foothills are being practically obliterated by erosion caused principally by destruction or alteration of the natural plant cover, resulting principally from grazing and also from the system of field cultivation with clearfelling and burning prevalent in the foot hill as well as high hill areas where contour trenching is unknown. . . . Different types of erosion damage are also discussed with details of recommendation for control. There are possibilities for improving water conservation everywhere by better farming practices

and better control of live stock to prevent overgrazing.—J. N. Sen Gupta.

9016. HANSEN, HENRY P. Pollen analysis of a bog in northern Idaho. Amer. Jour. Bot. 25(4): 225-228. 1939.— Pollen analysis of a bog in Northern Idaho located in a white pine (Pinus monticola) type of subclimax status, and within a cedar—hemlock—white fir climax formation shows several stages of postglacial forest succession and climate. The pioneer forests consisted of white pine and lodgepole pine (P. contorta), marking an initial cool and medium dry period. An abundance of Douglas fir (Pseudotsuga mucronata), and grasses may reflect a 2d warmer and perhaps dryer period. A 3d period of increase in white pine to become dominant over lodgepole pine indicates increasing coolness and moisture. This period was followed by a trend toward climax development of cedar (Thuja plicata), hemlock (Tsuga heterophylla), and white fir (Abies grandis). A 5th period of white pine increase was followed by another climax development trend. Climate probably has remained uniform since the maximum coolness and moisture of the third period was reached.—H. P. Hansen.

9017. HARRISON-SMITH, J. L. The kauri as a host tree. New Zealand Jour. Forest. 4(3): 173-177. 1938.—Altogether, 53 spp. of plants (listed) belonging to 37 genera were found on 7 kauri (Agathis australis) trees from several localities in the Waipoua Forest, New Zealand. Of these, 21 were true epiphytes, 2 were climbers, 8 or 9 were forest trees, and the others were small plants usually found on the ground.—W. N. Sparhawk.

9018. JONAS, FR. Das letzte Interglazial (Riss-Würm) in Osteuropa. Ein Beitrag zur Quartärstratigraphie des Ostens. Beih. Bot. Centralbl. Abt. B. 56(1/2): 175-212. 10 fig. 1936.—Some essential regional differences in the vegetation of the interglacial periods are described from the study of 8 east European Riss-Würm (RWI) interglacial bog profiles. Carpinus and Abies extended farther to the northeast during the RWI than in the post-glacial; Carpinus especially underwent the greatest reduction in its area while Fagus attained a much wider distribution in middle Europe in the post-glacial than in the RWI. The interglacial profiles of Leskovichi and Lojew, which lie farthest to the southeast, show that the zone of forests at that time extended farther into the steppes than at present, probably a result of higher precipitation. Accordingly we must explain the limited distribution of the beech in the RWI. The high percentage of Fagus in the late Tertiary deposits probably comes from F. orientalis. It is possible that F. silvatica is of late Diluvial origin and attained its first limited distribution in the RWI but its maximum distribution only in the post-glacial. In agreement therewith attention may be called to the absence of high moors. The sphagnum associations of forest moors of that time consisted of a mixture of eutrophic and oligotrophic vegetation. The characteristic generations-complex of the north European post-glacial high moor vegetation was still absent in the RWI. In place of it soligenous formations such as *Empetrum-Betula nana* and *Calluna* heath moors had already appeared. These latter were present in the North Sea region at the end of the 3d phase of the RWI. We know that Eem transgression was in the warm period of the RWI. Its effect was greater than that of the *Litorina* transgression, particularly in the basin, as a result of which the influence of the Atlantic climate must have been shifted further to the east than was the case in the post-glacial.-

Auth. summ. (tr. by H. F. Bergman).

9019. JUDD, B. IRA, and M. D. WELDON. Some changes in the soil during natural succession of vegetation after abandonment in western Nebraska. Jour. Amer. Soc. Agron. 31(3): 217-228. 1939.—In a study of soil changes during natural succession of vegetation on abandoned land in Kimball County, Nebraska, determinations were made of water infiltration rate, percolation rate, volume-weight, state of aggregation, and the quantity of plant roots, organic matter, and nitrogen in the soil of cultivated, abandoned, and native grassland fields. Infiltration and percolation were rapid in wheat stubble and in fields abandoned for several years, but were slow in native grassland and in fields abandoned for 1 year. The volume-weight and percentage of aggregation larger than 0.5 mm were highest in soils having the lowest infiltration rate and were generally lowest where

infiltration was most rapid. Organic matter and N tended to be lower in cultivated and abandoned fields than under native grasses, but the difference was not statistically significant. The root content of the soil of cultivated fields was ½-⅓ that under native grasses. Several years of abandonment increased the root content slightly. Under native grasses 7.3% of the soil organic matter in the surface 6 in. and 2.2% of that in the 2d 6 in. consisted of plant roots. Under cultivation or abandonment, the % of root material was much smaller.—M. D. Weldon.

9020. KESSELL, S. L. Effect of burning of slash on soil and succeeding vegetation. Indian Forester 64(7): 443-445. 1938.—According to modern trends of thought and practice in Australia fire is no longer considered essential for the reproduction of Eucalypts there. A strong surface fire will, on the contrary, destroy practically all their seed except that carried by the trees at the time of the fire. Seedlings on and around ash beds derive benefit not only from the fertilizing value of the ash but also from the absence of grass and scrub competition for a long time on ash beds.—

J. N. Sen Gupta.

9021. LAWRENCE, DONALD B. Some features of the vegetation of the Columbia River Gorge with special reference to asymmetry in forest trees. Ecol. Monogr. 9(2): 217-257. Map, 5 fig. 1939.—Some of the main physical features of the Columbia Gorge are discussed, including geology, topography, soils, flood history, and tributary drainage systems. Notable vegetational features are descr., with special reference to habitat conditions as these differ from west to east and from north to south. The gorge appears to have acted as an east-west corridor for and as a N-S barrier to plant migration. Observations concerning flood tolerance of firs and pines lead to the conclusion that Douglas fir is very intolerant, ponderosa pine considerably more tolerant. The one-sided tree crowns of the western and eastern regions of the gorge, especially those of Douglas fir, are descr., with photographs, and the weather condition control of crown asymmetry is descr. and discussed. In the western part, the firs are pruned through breakage due to the action of occasional easterly winter gales accompanied by heavy deposition of ice. These crowns extend only in a westerly direction. These firs are also subject to parch blight by which the foliage and branchlets on many unbroken branches are winter-killed. In the eastern part, the firs show little or no signs of storm breakage or parch blight, but they are wind-trained, by the strong westerly winds of summer; their crowns generally extend only in an easterly direction. In the middle region of the gorge, in the vicinity of the Cascade Rapids, both forms of fir crown may be seen. The western, storm-pruned type of tree asymmetry has apparently not been described previously.—Auth. summ.

9022. LEGLER, FRITZ. Studien über die Ökologie der rezenten und fossilen Diatomeenflora des Egerer-Franzensbader Tertiärbeckens. I. Das Quellgebiet und der Kieselgurschild der Soos. Beih. Bot. Centralbl. Abt. A. 59(1/2): 1-116. 7 fig. 1939.—Three layers of sediment are found in the diatom deposits of the Soos: Anomoeoneis-sediment (A), a black, mineralized kieselguhr with about 20% iron sulfide; turf sediment (B), a brown kieselguhr, up to more than 1 m. thick, with 2-70% diatoms (*Pinnularia*) with intermixed plant remains; *Nitzschia*-sediment (*C*), the most recent, bright brown to bright gray kiselguhr, 8-15 cm. thick. *A* is the oldest; it was deposited in the pine-hazel period. The formation of B lasted from the oak mixed forest-spruce period up to the recent pine-spruce period, in which C also must have been deposited. While A and C show a dominance of mesohalophile and halophile forms, the indifferent Pinnulariae preponderate in B. The recent diatom flora in the Soos far exceeds the fossil in number of spp. As almost all fossil diatoms are now present the ecological relations at the time of deposition of the sediments seem not essentially different from those of today. The diatom flora of a water containing sulphates and of a water containing chlorides at the same conc. and with other ecological factors alike includes the same "indicator" forms. At the same time the relation of the cations is essential. Two new terms are proposed for the characterization of the tolerance of many diatoms towards large amounts of active iron: eurysiderile for those for which the range of tolerance is

wide; and stenosiderile for those with a narrow Fe-range and greater sensitivity toward large amts. of active iron. Diatoms new for Bohemia are listed. Chemical methods for culturing diatoms are given in an appendix.—From auth.

summ. (tr. by H. F. Bergman).

9023. MacDOUGAL, D. T. Studies of root systems of trees. Eastern Shade Tree Conference, Proceedings Dec. 8, 9, 1938. p.67-68. 1939.—Systematized information as to stature and disposition of roots of trees beyond the seedling and nursery stage is very fragmentary. The results of studies from excavated and uprooted Monterey Pines showed that of the woody material of this pine tree 1-7 of the total amount in trunks and branches was used in the root systems. Taken in connection with dendrographic studies, it is apparent that the flaring bases of trunks and the abruptly enlarged basal portions of attached roots constitute a distinct physiological unit, or well-defined region, so far as period of seasonal growth, activity of the cambium and conc. of growth-promoting substances are concerned. Its individuality becomes more marked with age and it is this mass of woody material that undergoes maximum stresses from the flexion of trunks swayed by the wind. Some of these features are reflected in the results of tests for specific gravity, crushing strength and modulus of rupture in the engineering laboratory. Field and laboratory studies of the development of root-systems with respect to: (a) Corresponding stage of the crown; (b) Nature of substratum; (c) Character of stand and associations; (d) Extent and volume of root-system, should be possible with trees that have been uprooted during storms. Systematized information as to the above features would constitute a contribution of permanent value in the physiology of trees, in forestry, horticulture and in all kinds of silviculture and ornamental planting.—R. Silverman.

9024. MEIER, F. C., and E. ARTSCHWAGER. Airplane collections of sugar-beet pollen. Science 88(2291): 507, 508. 1938.—In the Rio Grande Valley in southern New Mexico, where sugar beets were being grown for seed production in 1938, an airplane flight was made on June 3 with a series of short exposures of agar plates at various altitudes from 1,000 to 5,000 ft. Sugar beet pollen grains, some of which germinated in the plates, were found at all altitudes with the number becoming fewer at 4,000 ft. At the 5,000-ft. level, which corresponds to the so-called "dust horizon," the number seemed appreciably larger than for the other altitudes except the lowest. The plates showed also numerous

fungus spores, plant hairs, and pollen from other spp. of plants, notably *Pinus* spp.—*Courtesy Exp. Sta. Rec.*9025. MICHALSKI, A., et F.-X. SKUPIEŃSKI. Recherches écologiques sur Physarum didermoides Rost, myxomycète endosporé. *Compt. Rend. Acad. Sci. [Paris]* 208(3):

225-227. 1939.

FRITZ, 9026. OVERBECK, und SIEGFRIED SCHNEIDER. Mooruntersuchungen bei Lüneburg und bei Bremen und die Reliktnatur von Betula nana L. in Nord-westdeutschland. Zeitschr. Bot. 33(1/2): 1-61. 1938.—In Melbeck Moor, 7 km. south of Lüneburg, an almost continuous record of Betula nana has been traced from the close of the sub-arctic pine-birch period to the period in which Fagus is represented. The main development of Betula nana may be traced on into the warmer period, where along the Atlantic section, extensive peat layers occur. consisting almost entirely of the remains of dwarf birch. As to the distribution of *Sphagnum* spp. in peat of recent deposition, the eastern limits for *S. imbricatum* and *S. papil*losum were reached in Lower Saxony. These limits are surprisingly sharp and extend from Tostedt over Rotenburg, near Bremen, over Diepholz in the direction of Brams. At Dannenberg near Bremen through a moor profile, almost 10 m. thick, and with a preponderance of organic deposits from a small lake basin, we pass directly to the woodless Tundra period. The main point here is that we get some evidence of temp. fluctuation in the late glacial period. Owing to the numerous analytical tests made on Melbeck and Hellwig Moors and at Dannenberg, this region may be divided into diagrammatic zones for a preliminary attempt to develop a pollen distribution map for Lower Saxony. For Zone X including the Bronze Age, and Zone (1) X including the Neolithic, time scales may be obtained by comparison

with archaeological findings. For the remaining zones a time scale can only be deduced by comparison with Danish, South Swedish and East Prussian pollen diagrams.—J. H.

Priestley.

9027. PONT, J. W. Ecological applications of the stomatal index. Beih. Bot. Centralbl. Abt. A. 59(1/2): 214-224. 1939. -A mathematical analysis of the observations required for determining the stomatal index of a sample has shown that a high degree of accuracy is obtainable. The size of the leaf-area required and the number of individual observations can be small. Significant differences in the stomatal indices of samples from different localities have been observed. The influence of slope exposure, slope level, and the effect of the presence of trees on the stomatal index of grass has been demonstrated. The method may prove to be of value in investigations on the water relations of plants.-Auth. summ.

9028. RANGANATHAN, C. R. Studies in the ecology of the Shola grassland vegetation of the Nilgiri Plateau. Indian Forester 64(9): 523-541. 1938.—The natural vegetation of the plateau is a mixture of temperate evergreen forest (shola), its seres and grass. The grasslands are extensive and are practically confined to the western plateau which is subject to annual ground frost. Here the shola is reduced to small, isolated woods occupying folds and hollows on the slopes and is relatively more abundant on slopes protected from the morning sun. The absence of fringing forest along perennial water-courses is a feature of the frost zone. The study of the altitudinal zonation shows shola to be the forest climax. Its known antiquity and stability, indicate that the grass is also a natural climax. The relative distribution of the 2 climaxes is governed by the incidence of frost. Frost damage on the Nilgiris is confined to young plants and is probably a kind of wilting effect due to plants exposed to the morning sun being unable to draw water from the frozen soil. The shola occupies slopes protected from the morning sun and sites where the danger of freezing is neutralized by abundant moving soil water. The grass though destroyed by frost revives quickly owing to its perennial rootstocks and its ability to spread vegetatively.— Auth. abst.

9029. REGEL, C. Geobotanische Beobachtungen auf einer Reise in Marokko und in der Sahara. Veröffentl. Geobot. Forschungsinst. Rübel 14: 192-216. 1939.—The so-called steppes of Morocco are not real steppes in the narrower (Russian) sense as they lack the czernosiom soil profile. The climatic conditions are also quite different: the steppe region has cold winters with well developed snow cover, precipitation maximum in summer. Morocco has mild winters with no snow cover and precipitation maximum in winter. The Stipa tenacissima "steppe" of Morocco is a typical semidesert. Besides there are also found typical duriherbosae, which are, however, not true steppes, e.g., the Stipa tortilis community, secondary and coming into existence when the original forests were destroyed.—As trees can grow in edaphically favorable places in deserts and steppes (oases, etc.) the desert and steppe climates seem not to preclude the growth of trees, but the soil precludes the growth of all but the hardiest trees and bushes.-Deserts seem to encroach on the forested or arable lands, chiefly because of mismanagement. Secondary deserts come into existence in the same way as secondary "steppes," they even include The distribution of Quercus ilex and the Querceta ilicis is discussed. In the W parts of the Mediterranean regions these communities constitute climaxes, in the eastern parts just paraclimaxes, as they are here confined to locally moister areas. The climax at the timberline is the same community that constitutes the lowland vegetation region further to the north. The climax at the foot of the mountain constitutes the timberline climax in the vegetation region further south.—K. Faegri.

9030. SCOTT, J. D., and N. G. Van Breda. Preliminary studies on the root systems of Pentzia incana-forma on the Worcester Veld Reserve. S. African Jour. Sci. 35: 280-287. 1939.—This species is not widespread on the Reserve but it occurs on light, loamy soils, in very definitely demarcated plant communities. Under normal conditions a tap root is first formed which grows to a depth of 1-12 feet in 4-5 months. It then splits up into 2 or 3 roots which may penetrate to 3 feet but there is no longer a main tap root. Once the tap root has split, the main root development takes place in the surface 3 inches of soil where the lateral roots ramify considerably. Stolons also give rise to masses of adventitious roots. A feature of the species is the enormous number of root hairs found on all the finer roots; under moist conditions, the whole root is covered by a mass of fine root hairs. This type of shallow root system probably accounts for the rapid drying up of the plant in drought and its rapid recovery after rains.—Authors.

9031. SMYTHIES, E. A. Soil erosion problems in India. Indian Forester 64(11): 704-708. 1938.—Destruction of forest growth in mountains, without compensatory terracing and regular cultivation, leads to a tremendous increase of erosion, avalanches, destructive floods, etc. In the plains and foothill areas also the change of the once fertile lands into desert has been ascribed by many to the destruction of the natural vegetation by man and his cattle. In the Jumna-Chambal basin in Northern India, between a quarter and a half million acres of land have had 20 to 40 feet depth of soil eroded, which represents a capital loss. Expts. carried out by the forest department during the past 25 yrs. in such areas have proved that control of grazing alone is sufficient to bring back the natural vegetation and check further erosion.—J. N. Sen Gupta.

9032. STEBBING, E. P. The man-made desert in Africaerosion and drought. Indian Forester 64(7): 454-466. 1938.—
There has arisen some confusion as to what is actually meant by erosion in different parts of the world. The soil erosion being experienced in several parts of Africa is mainly attributed to excessive land utilization. The intensive wasteful utilization of the soil upsets nature's balance, resulting in an interruption of the water-supplies, including that of rainfall. It is suggested that when the erosion and rainfall have arrived at the intermittent stage, amelioration works can no longer with safety be delayed. Closure of eroded areas to cultivation, to grazing and to firing will work marvels in Africa.—J. N. Sen Gupta.

9033. STOPP, F. Quercus cerris L. im Friedewald nördlich Radebeul. Tharandter Forstl. Jahrb. 90(1): 60-68. 6 fig. 1939.—96 wild Q. cerris saplings were found scattered over an area of 9 sq. km. north of Dresden. The parent tree was located in a garden 1-3 km. away. The acorns must have been distrib by journ.—W. N. Spachagel.

been distrib. by jays.—W. N. Sparhawk.

9034. TRAPNELL, C. G. Ecological methods in the study of native agriculture in northern Rhodesia. Bull. Miscell. Inform. Kew 1937(1): 1-10. 4 maps. 1937.—Methods employed on the ecological survey of Northern Rhodesia are discussed, with summaries of soil and vegetation types and of native agricultural systems of the western half of the Territory. Composite vegetation—soil units are employed for mapping purposes. A close relationship is found between main soil groups, vegetation types and native agricultural practice, which is associated with the native's use of significant plant indicators in selecting land for his staple crops. Ecological survey is held to provide the best means of understanding the native's agricultural tradition, and of investigating the possibilities of progress in it or of remedying departures from it.—C. G. Trappell.

9035. TURRILL, W. B. Ecological isolation. Bull. Miscell. Inform. Kew 1938(9): 384-390. 1938.—The importance of studying the degree and kind of isolation in taxonomic studies is stressed. A group is a "better" species the greater its internal uniformity and the greater its isolation. A species is ecologically isolated when it lives under different conditions from its congeners. The different kinds of isolation (geographical, ecological, cytogenetic, physiological) often occur together, interact and tend to be cumulative. Examples of ecological isolation caused by climatic, edaphic and biotic factors are given. Turesson's work on ecotypes is briefly considered. The isolation of areas of similar ecological attributes is discussed and it is concluded that isolation gives a chance for divergent, convergent, or parallel evolution under similar but more or less isolated ecological conditions. A plea is entered for the intensive study of wild floras before man further destroys or modifies them.—W. B. Turrill.

9036. WAGENKNECHT, E. Untersuchungen über die

Vegetationsentwicklung nach Streunutzung in einem märkischen Kiefernrevier. Zeitschr. Forst- u. Jagdw. 71(2): 59-78. 2 fig. 1939.—Plant succession following litter removal in a pine forest was studied by analyzing the vegetative composition of sample quadrats on areas from which the litter was last removed at various times within the last 50 yrs. Of the 52 spp. found on 33 quadrats, only 5 were of major significance: Calluna vulgaris, Hypnum schreberi, H. cupressiforme, Dicranum scoparium, and D. undulatum. Calluna is one of the first plants to occupy exposed mineral soil; it is followed or accompanied by H. cupressiforme and D. scoparium. H. schreberi does not appear in quantity until the heather has grown enough to produce shade. Unless the cover is disturbed, H. schreberi tends eventually to crowd out the heather, which reaches its maximum development in about 15 yrs. Practically the entire surface was revegetated within 10 yrs. after the litter was removed. On the poorer sites heather is less aggressive, and thrives only in openings; recovery of the soil cover is quicker if a heavy thinning is made when the litter is removed. H. cupressiforme and D. scoparium are more abundant than on the better sites. D. undulatum occupies an intermediate position with respect to site requirements. Few new spp. came in after 10 yrs. The number of spp. of flowering plants was much larger on the better than on the poor sites; there were more spp. of lichens (Cladonia) on the poor sites.—W. N. Sparhawk.

9037. WARREN, W. D. M. Erosion. Indian Forester 64 (10): 622-624. 1938.—Most of the hill streams in forest areas descend at steep gradients,—which practically rules out gully plugging as an erosion control measure. Contour trenches, however, check the run-off and provide favorable soil conditions for heavier vegetation, and by their mechanical action soil losses are reduced to their minimum.—

J. N. Sen Gupta.

9038. WEAVER, J. E., and F. W. ALBERTSON. Major changes in grassland as a result of continued drought. Bot. Gaz. 100(3): 576-591. 9 fig. 1939.—As a result of the great drought in Nebraska (1934-1937) many perennial grasses have decreased greatly in abundance. Little blue-stem (Andropogon scoparius), formerly one of the most important dominants, has suffered great depletion, disappearing from some prairies. Bluegrass (Poa pratensis), big bluestem (Andropogon furcatus), and Indian grass (Sorghastrum nutans) have all become much less abundant on uplands. Certain shallowly rooted spp. of non-grasses or forbs have almost entirely disappeared, a few have greatly increased in numbers, but general losses have been approximated at ½-3. The annual Festuca octoflora, Bromus secalinus, and Hordeum pusillum were especially abundant during the early yrs. of drought but much less so during 1938. The scourge of the ruderal, Lepidium virginicum, so serious in 1936-37, has disappeared. Other annual weeds were extremely abundant in prairie only during 1 or 2 seasons. Aster multiflorus, a perennial with rhizomes, spread so widely in drought ravaged areas as to ruin many prairies for production of hay and resulted in breaking. Erigeron ramosus was almost equally widespread. Numerous forbs with fleshy storage organs—Oxalis violacea, Allium mutabile, Tradescantia bracteata et al.—increased remarkably in abundance. Western wheat grass (Agropyron smithii) occurred sparingly at the beginning of the drought but has spread so widely as to occupy 1-1 of many former bluestem prairies. Numerous native grasses and especially Stipa spartea, Sporobolus heterolepis and Bouteloua curtipendula have become far more abundant and important. The short grasses (B. gracilis and Buchloe dactyloides) have greatly increased. Drought has reduced the basal cover in true prairie 50-66%. The lower layer of grasses and forbs has been almost destroyed and grassland types have been much modified.— $J.\ E.$

9039. ZOHARY, MICHAEL. Die Verbreitungsökologischen Verhältnisse der Pflanzen Palestinas. I. Die antitelechorischen Erscheinungen. Beih. Bot. Centralbl. Abt. A. 56(1): 1-155. 12 pl., 17 fig. 1937.—Climatic, phytogeographic and phytosociological relationships are presented briefly. The effect of rain, wind, topographic and biotic factors in relation to the dispersal of disseminules is discussed. Most of the disseminules of the plants of the region not only have no

adaptations for dispersal but even have characteristics which restrict dispersal, with which the present work is primarily concerned. Antitelechory may come about as a result of the reduction of the mechanism for dispersal in synaptospermy and heterocarpy; by the formation of anchoring organs or means of anchorage in trypanocarpy and myxospermy; by the manner of growth, mode of branching, etc., of the mother plant as in basicarpy, amphicarpy and basicarpy; or by the retardation of dispersal in astatiphory and hygrochasy. Each of these phenomena is defined and plants of Palestine belonging to each group are listed. Salient points under each group are discussed, such as: ephemeral synaptospermy, the systematic-phylogenetic relationships of synaptosperms and of heterocarpous plants, and the geographical distribution of plants of these groups; morphological, physiological, and ecological differentiation of disseminules in heterocarpous plants; ecological relationships in the distribution of basicarpous and of hygrochastic plants; the biological significance of amphicarpy and of slime secretion in myxosperms; and other features in the various groups.—H. F. Bergman.

OCEANOGRAPHY

9040. CLARKE, GEORGE L. The relation between diatoms and copepods as a factor in the productivity of the sea. Quart. Rev. Biol. 14(1): 60-64. 1939.—The traditional impression of copepod production is that it follows and is dependent upon the growth of diatoms. But others suggest that it is independent; and still others suggest that the population of the two in a given area is inversely related. Obviously the feeding habits of the copepods are the clue to the situation; and these are reviewed, without, however, a clear solution to the problem being yet obtainable.—H. G. Sugara

9041. WATERMAN, TALBOT H., RUDOLF F. NUNNE-MACHER, FENNER A. CHACE, Jr., and GEORGE L. CLARKE. Diurnal vertical migrations of deep-water plankton. Biol. Bull. 76(2): 256-279. 1939.—A study was made with the aid of closing nets of the diurnal vertical migrations of bathypelagic organisms at a station in continental slope water of the western N. Atlantic. While the hauls were being made a continuous record of the light intensity at the surface was kept. The penetration of light into the upper 84 m. was directly measured photometrically; the average extinction coefficient for green light was k = 0.092. All of the malacostracan Crustacea (to which the detailed results presented in this paper are limited) which occurred in sufficient numbers for analysis exhibited diurnal migrations 200 to possibly 600 m, in vertical extent. The speed of vertical movement in these migrations varied from 24 to 125 m. per hr. among the various crustaceans. A considerable part of the migrations took place while the light intensity even at the surface was no greater than starlight. Several Crustacea living at 800 m. during the day showed extensive diurnal vertical migrations. It is concluded, however, that whether the migrations are regulated by external environmental or by internal physiological factors, at some time of day the organisms concerned are affected by light penetrating from the surface. Calculations made from the light penetration data indicate that the amount of light probably present during the middle of the day at the depths where the animals were migrating was adequate to support this conclusion.—Auth. summ.

LIMNOLOGY

(See also in this issue Entries 8991, 10091, 10571)

9042. HOWES, N. H. The ecology of a saline lagoon in Southeast Essex. Jour. Linn Soc. [London] Zool. 40: 383-445. 2 pl., 5 fig. 1938.—Chemical and physical factors together with the flora and fauna of a dammed creek in southeast Essex, England, are described. The creek had been completely isolated from river and sea for 9 yrs. and the salinity varied from 21.5% to 27.9%. Monthly visits were made between Jan. 1934 and April 1935, when samples of flora, fauna and of the water were collected and the latter analysed. Results of detas. of the chemical constitution of the water, i.e., Na, K, Ca, Mg, Cl', SO₄", etc. are given and the annual cycles in salinity, pH, temp. and the content of Fe, excess base (Alkalinität), P₂O₅, SiO₂ and O₂ descr. An attempt to collect plankton quantitatively was made; results

obtained show that the productivity of zooplankton was much lower than in the sea. The floor of the creek was fairly uniformly covered with Ruppia maritima and Chaetomorpha linum was present in quantity during the summer. A list of 48 spp. of animals found is given. From the results of the analyses, the creek as an environment is discussed in relation to the physiology of its inhabitants.—N. H. Howes.

9043. HUMPHRIES, CARMEL F. The Chironomid fauna of the Grosser Plöner Sea, the relative density of its members and their emergence period. Arch. Hydrobiol. 33 (4): 535-584. 6 fig. 1938.—In a study primarily based on pupal exuviae made from March to Oct. 1936, 43 genera and 86 spp. were found living in the lake, of these 14 spp. are Tanypodinae, 24 spp. Orthocladiinae, 29 spp. Chironomariae and 19 spp. Tanytarsariae. Comparison with the still waters of the Bavarian Alps indicates that in these alpine lakes the Tanypodinae are proportionably better represented, but otherwise the disposition of the groups is similar though only 14 spp. are common to the 2 lists. Comparison with observations made by Thienemann intermittently in 1917-1922 shows that 29 spp. occurred in this earlier period but not in 1936, while 41 spp. occurred in 1936 but not in the earlier period. The changes in composition were least noticeable in the Tanypodinae, most noticeable in the Tanytarsariae. Increasing eutrophy may be involved in the disappearance of forms such as Monodiamesa bathyphila, but it is difficult to assess variation due to differences in meteorological factors in different years. As indicated by pupal skins Rheortho-cladius oblidens, the larvae of which live in Cladophora and Aegagrophila is the commonest species, the supposedly characteristic deepwater Chironomus anthracinus (=bathophilus) and C. plumosus being 5th and 17th respectively in the order of abundance. Detailed data on the period of emergence are given. The surface temp, appears to be important in regulating emergence, even in the deepwater forms not exposed to the great seasonal variations of the upper water. The incidence of spring and autumn turnover may well be of critical import in regulating the seasonal appearance of the adults. An intersex of Einfeldia dissidens parasitized by *Paramermis* sp. (?), and several undet'd. pupal skins are described.—G. E. Hutchinson.

9044. M'GONIGLE, R. H. Temperature characteristics for certain fresh waters. Proc. Nova Scotian Inst. Sci. 19(4): 428-438. 1937/38(1939).—Bodies of water can be readily compared insofar as temp. is concerned, and the suitability of any body of water for various aquicultural purposes can be readily detd. by fitting the "sine curve" to temp. observations. Ponderous masses of temp. readings, otherwise difficult to handle, are reduced and made easy of treatment (liquidated). A measure of that very important ecological

factor, temp., is thus provided.—Auth. abst.

9045. PROTIC, GEORG. Hydrobiologische Studien an alkalischen Gewässern der Donaubanschaft Jugoslawiens. Arch. Hydrobiol. 29(1): 157-174. 1935.—Six ponds were studied, all but one (Palicer, depth 8 m., area 576 hectares), under 2 m. in depth and under 100 ha. in area. Very curious chemical analyses of Palicer and Rusanda Ponds are given, in the case of the former entries for Aluminum hypophosphate and Silicium carbonate (sic) being made. All are clearly rich in sodium chloride, carbonate and probably sulphate, phosphate appears to be high, Li may be present. 21 spp. of diatoms, the dinoflagellates Peridinium trochoideum and Exuviaella laevis, the copepods Laophante mohammed and Eurytemora affinis and the rotifer Brachionus mülleri are considered as probably relicts of an inland sea; transport by birds is, however, not excluded. The 3 halophil animals mentioned occur together only in Rusanda (org. matter 2.38 g. per l., NaCl 1.893 g. per l., Na₂CO₃ 1.976 g. per l., Na₂SO₄ 1.88 g. per l.) in company with a much more abundant fresh-water plankton, the dominants being Diaptomus vulgaris, D. castor and Daphnia longispina, with 13 other fresh-water entomostraca and 6 fresh-water rotifers. Palicer (NaCl 3.1156 g. per l., Na₂CO₃ 1.2283 g. per 1.) has a similar fresh-water association with Diaptomus vulgaris and Daphnia longispina dominant, but with only Eurytemora among the halophil forms. Comparable zooplankton without any halophil elements was found in 2 unanalyzed ponds; phytoplankton, except Scenedesmus in Palicer, was almost absent; but in 2 other unanalyzed ponds,

Cyanophyceae and diatoms were very abundant, including the halophil members of the latter group. In these 2 ponds, a poor and purely fresh-water plankton, not qualitatively different from that in the preceding ponds, was found.-

G. E. Hutchinson.

9046. RÜSCHE, ERICH. Hydrobiologische Untersuchungen an niederrheinischen Gewässern. X. Nährungsaufnahme und Nährungsauswertung bei Plumatella fungosa (Pallas). Arch. Hydrobiol. 33(2): 271-293. 2 fig. 1938.—All particles if not too large are taken with little selection. The mean time of sojourn of food in the gut is 90 min. Trachelomonads, Euglena acus, Phacus caudata and Lepocinctis spp. pass through unharmed; Eudorina elegans, Pandorina morum and green algae with coarse cell-walls are not digested. Diatoms, Chlamydomonas and rotifers (but not their eggs or loricae) are digested. The polyzoan is most abundant on water lily stems in the upper and middle water where there is most plankton. Studies of faecal pellets show that the Euglena acus of 1 cc. of water are removed in 41 hrs. by a single polyp, the *Trachelomonas* in 5.9 hrs., the rotifers in 4.8 hrs. Undigested algae, being embedded in the pellets, fall into the tropholytic zone and become available to Cladocera, particularly Bosmina longirostris. Chironomid larvae live on the polyzoa in numbers; as the bottom of the pond is practically sterile these larvae are an important source of fish food. Fulica atra and Gallinula chloropus feed on the Plumatella. Removal of detritus by the latter purifies the water.—G. E. Hutchinson.

9047. TORKA, V. Diatomeen aufwuchs von Potomogeton nitens Web. Arch. Hydrobiol. 29(1): 121-129. 3 fig. 1935.— Material from 3 German lakes (Paklitzsee, Tegelersee, and Röthesee) contained 63 spp., Benthic mud living forms, plankton forms, the members of the genera comprising large spp., and except Navicula scutelloides, the members of N. punctatae, are rare or absent. Epithemia spp. and Cocconeis placentula are well represented. Some of the less common spp., including Caloneis potamea* are regularly encountered in the biocoenosis.—G. E. Hutchinson.

9048. WERNER R. A. Uebersicht über die derzeitig bekannte Kryptogamenflora Marokkos mit besonderer Berücksichtigung einiger interessanter Disjunktenelemente. Veröffentl. Geobot. Forschungsinst. Rübel. 14: 217-221, 1939. -The Moroccan cryptogam flora demonstrates a decided Mediterranean character with a great number of spp. belonging to a somewhat cooler climate. There is also an interesting element of tropical disjuncts, especially among lichens. Most of them belong to the W. African tropics, but many are Central American or have at least their nearest relatives there. There is another Eurasian-American element that is not decidedly tropical, some species with intermediate stations in Himalaya. Along the W. coast is found an interesting element of oceanic spp. The marine algal flora is of the Hispano-Canryan type with many tropical spp. and lacking a great number of the temperate ones. The freshwater algal flora seems to be decidedly European.

-K. Faegri. 9049. WIEMANN, REINHOLD. Hydrobiologische Untersuchungen an niederrheinischen Gewässern. IX. Über die Bedeutung von Abwasser und Grundwasser bei Massenentfaltungen von Plankton, insbesondere von Chlamydomonas pomiformis, in den Niepkuhlen. Arch. Hydrobiol. 33(2): 257-270. 1938.—An immense local development at the lower end of a chain of ponds, dilatations of the R. Kendel, is traced to a tributary stream. This stream is strongly contaminated, and in its upper reaches is low in O2, high in P, bicarbonate, chloride, and ammonia. Some P is lost by precipitation as Fe is oxidized lower in the stream. There is some dilution by ground water, which raises the nitrate content above that due to nitrification. The resulting selfpurified water is much richer in nutrients than the pond. A localized algal bloom is consequently produced with its maximum development opposite the entrance of the stream, but detectible over half the area of the pond. On Aug. 26, 1937, over 100,000 C. pomiformis per cc. were present. Some of the zooplankton tend to be similarly distributed. Faunistic and floristic notes on various parts of the system are given.-G. E. Hutchinson.

WILDLIFE MANAGEMENT-AQUATIC

(See also the section "Pisces"; and Entries 10032, 10033, 10036, 10040, 10052, 10055, 10056, 10496, 10560, 10620)

9050. CLARK, FRANCES N. Measures of abundance of the sardine, Sardinops caerulea, in California waters. Div. Fish and Game California Fish Bull. 53. 3-37. 2 maps. 1939. —The paper attacks the problem from various points of approach, calls attention to 4 measures that point to a decrease in abundance of sardines in area studied, and concludes that "the present intense fishing is placing a severe strain on a badly decimated population and making correspondingly difficult the restoration of that population to anything like its former magnitude. An immediate curtailment of the total catch would more quickly assure a restoration than would the postponement of that curtailment until the population is so depleted that it is no longer

ment until the population is so depleted that it is no longer profitable to carry on the industry."—H. W. Clark.

9051. ESCHMEYER, R. WILLIAM. Analysis of the complete fish population from Howe Lake, Crawford County, Michigan. Papers Michigan Acad. Sci., Arts and Lett. 24 (2): 117-137. 1938(1939).—The fish population of a 13.4 acre northern Michigan lake comprised 23,528 individuals begin a total michigan lake comprised 23,528 individuals acre northern Michigan lake comprised 23,528 individuals having a total wt. of 509.4 lbs. Spp. commonly represented were Catostomus c. commersonni, Cyprinus carpio, Hyborhynchus notatus, Eupomotis gibbosus, Aplites salmoides, Perca flavescens and Boleosoma nigrum. Cannibalism in the bass was prominent; the largest young-of-the-yr. weighed 49 times the wt. of the avg. young early in Sept. when the fish were examined. Adult bass, with one exception had grown slowly during their 1st, yr. of life. The tion, had grown slowly during their 1st yr. of life. The evidence suggested a close correlation between rapid growth and early mortality. The ratio of young bass to adults was 145:1; for perch this ratio was 158:1. The abundance of sunfish could be controlled by destroying the spawning beds. R. W. Eschmeyer.

9052. FONTAINE, MAURICE. La lamproie marine, sa pêche et son importance économique. Soc. Océanog. France Bull. 18(97): 1681-1687. 5 fig. 1938.—The newly hatched Bull. 18(97): 1681-1687. 5 fig. 1938.—The newly hatched larva or "ammocète" resembles a worm more than a fish and passes the first years of its life buried in the mud. At the end of 3 or 4 years, it undergoes in a few weeks a rapid metamorphosis and begins the feeding habits of the adult. Lampreys are fished by 4 principal types of gear: "the dog," a pair of large wooden pincers with the jaws lined with nails; a dip net 1.5-1.8 m. in diam., called a "sauce pan"; a water wheel rotating a series of flat nets which dip the lampreys into a bin; and fulls traps made of reads pair , a water wheel lotaing a series of hat hels which the the lampreys into a bin; and fyke traps made of reeds, usually baited by placing a sexually ripe of in them, which will attract up to 30 PP into the trap by the following day (consequently early in the season such of are valuable).— J. A. Aplin.

J. A. Aptim.

9053. FREY, DAVID G., and HUBERT PEDRACINE.
Growth of the buffalo in Wisconsin lakes and streams.

Trans. Wisconsin Acad. Sci., Arts and Lett. 31: 513-525.

7 fig. 1938.—The growth of the buffalo fish during the first
2 yrs. was nearly the same, 116 and 120 mm. respectively, and after that it declined gradually and regularly. The growth rates of buffalo fish from different bodies of water were remarkably similar, but there was some indication that those living in running water grew more slowly in length and in wt. with relation to length than those in standing water. There was fairly good evidence that the buffalo fish ran in cycles, with good seasons every 3d yr.— Auth. summ.

9054. HARTLEY, G. W. Salmon caught in the sea—West Sutherland, 1937. Fisheries, Scotland, Salmon Fish., 2. 1-21. 4 fig. 1938.—Data were analyzed from salmon and grilse netted on the west coast of Scotland in 1937 for tagging purposes. The migrations of the fish tagged are considered in a separate paper [see in this issue entry 9057]. 324 grilse and 124 salmon provided the data for this work. The fish are classified into various age groups. The age groups are compared with age groups of a similar experiment in the previous year. Grilse formed 72.4% of the catch. The ages of the fish when they migrated as smolts were determined and are compared with similar data of the previous year. Average weights and lengths of salmon and grilse in 1936 and 1937 are compared. The condition factor of grilse is considered in detail. The average grilse condition factor for the season was 1.18. Scales were measured. and the average calculated lengths at the end of each winter of river and sea life are recorded for the various groups. Growth increments, as determined from scale measurements, are recorded, and show the growth rate to be irregular. The occurrence of marginal checks was noted, especially among grilse. The percentage of grilse bearing marginal

among grilse. The percentage of grilse bearing marginal checks and the period of capture is shown. Eight fish among the 448 captured showed scale erosion.—Z. E. Parkhurst.

9055. LOOSANOFF, VICTOR L. Effect of temperature upon shell movements of clams, Venus mercenaria (L.). Biol. Bull. 76(2): 171-182. 1 fig. 1939.—Analysis of 399 daily records of shell activities of 47 clams, kept in large outdoor tide-filled tanks and subjected to temps. ranging from —1.0 to 28.0°C, showed that the length of time which the animals remain open partly depends upon the temp. of surrounding water. Majority of clams entered into hibernating stage at a temp. of about 5°C but a few animals remained active even at lower temp. Within the temp, range of 3.9-10.9°C, the average period of openness increased from 4 to 88% of total time, thus showing a correlation with the rise of temp. However, no such correlation could be found with the further increase in temp. ranging from 11 to 27.9°C. Within this temp. range the shells were open from 69 to 90% of the total time, but the percentage did not increase simultaneously with the increase of water temp. The highest percentage of time open was recorded at 21-22°C, when the clams remained open 90% of the total time, or 21 hrs. and 36 min. per 24-hour period. Small changes in the temp. of the surrounding water did not influence the shell movements of clams. There appeared to The animals were closed for somewhat longer periods in daytime than in darkness.—V. L. Loosanoff.

9056. MACFARLANE, P. R. C. Salmon of the upper Solway district 1934. Fisheries, Scotland, Salmon Fish. 3.

1-18. 1938.—A scale sample was obtained from 1,890 salmon and grilse taken throughout the fishing season of the year 1934. The sample was divided into the various age groups and smolt ages. The scale sample was correlated with the percentage figures of the total commercial catch in each month in the area under investigation. Grilse and small summer fish together comprised three-quarters of the total catch, while spring fish formed only one-fifth. Among the summer-running fish there was a greater concentration into a shorter period of the grilse run than that of the small summer fish. In the spring groups, the 3 winters fish ran earlier than those of one year less sea-feeding. The proportion of previously spawned fish was only 1.1%. age at which the fish migrated as smolts was determined; 87.6% migrated as two-year-old smolts. Smolt age at migration varies directly with the latitude, there being a steadily increasing proportion of the younger smolts towards the south. The average weight, length, and condition factor of each age group in each month throughout the fishing season was detd. Summer fish were in better condition than spring fish, and condition improved within each age group as the season advanced. The lengths attained at the end of each previous year of river and sea life were calculated from scale measurements, and average figures thus obtained for each age group and smolt age. Older smolts developed from shorter parr, but they ultimately attained a greater size than those which migrated at a lesser age. The calculated smolt lengths were the largest encountered in the Scottish investigations. Previous work indicates that available food supply plays a major part in determining the size at which smolts migrate. In common with other west coast investigations, the calculated lengths at the end of the first year of sea life were greater than those found on the east coast, which indicates that fish of the 2 coasts frequent different marine feeding grounds. The amount of rapid growth made in the sea by grilse and small summer fish in each month from the end of the previous slow growth period showed a steadily increasing progression up to the end of the season. Scale erosion was exhibited only by fish in the latter part of each run, and then only in minor degree.—Z. E. Parkhurst.

9057. MENZIES, W. J. M. The movements of salmon marked in the sea. II. The west coast of Sutherland in 1937. Fisheries, Scotland, Salmon Fish. 1. 1-9. 1938.—

This work corroborates a similar previous experiment that the movements of salmon during the period of recapture were definite migrations back to the rivers where they were hatched. In 1937, 448 fish were marked on the north-west coast of Scotland. 58 fish (13%) were recaptured, the majority being taken on the N and E coasts. Fish taken in or close to various rivers had scales, the parr area of which was recognizable as typical of fish of the respective areas of recapture. Fish making the longer migrations tended to travel faster, although the rate was not regarded as accurate because there was no data as to the actual course of migration, or the time spent at the place of tagging and in the region of destination before recapture. A general rate of between 15 and 25 miles per day was indicated. Norwegian, Scottish, and American types of tags were employed. The Norwegian type had the largest percentage recaptured, but it was employed during that portion of the season when recaptures were most numerous. The small number of fish did not allow definite

numerous. The small number of fish did not allow definite conclusions to be drawn as to the efficiency of the several types of tags.—Z. E. Parkhurst.

9058. MENZIES, W. J. M. The movements of salmon marked in the sea. III. The Island of Soay and Ardnamurchan in 1938. Fisheries, Scotland, Salmon Fish. 7. 1-9. 4 fig. 1938.—An analysis of the migrations of adult salmon and grilse. 94 adult salmon were tagged in the year 1938 at the Island of Soay, off the west coast of Scotland. 280 grilse were tagged at Fascadale, a point on the mainland. 22 (23%) returns were obtained from the Soay expt. and 35 (12.5%) returns from the Fascadale station. Equal numbers of Scottish and Norwegian type tags were used, as well as a limited number of American strap tags. No as well as a limited number of American strap tags. No appreciable difference occurred in the number of recoveries of the Scottish and Norwegian type tags, but the American tags were less successful. The Soay fish (adults) were retaken chiefly on the north and east coasts. The proportion of Soay fish which left the west coast was as high as the proportion from a tagging station more than 100 miles farther north in a previous year. The Fascadale fish (grilse) were retaken within a radius of 30 or 40 miles from the tagging location, although 3 were recaptured in Ireland, 1 in Wales, and 4 on the east coast of Scotland. No grilse were recaptured on the north coast. It is suggested that migrations to the north and east coasts from the vicinity of the tagging localities may be made on the west side of the Outer Hebrides as well as by the Minch.—Z. E. Parkhurst.

9059. NALL, G. HERBERT. Sea trout of the River Carron and Loch Doule (Dhughaill), Western Ross-shire. With an appendix on salmon from the same river, by P. R. C. MACFARLANE. Fisheries, Scotland, Salmon Fish. 4. 1-42. 6 pl. 1938.—The data were obtained from scales and measurements of 1.811 sea-trout and 123 salmon from Loch Doule and the River Carron on the northwest coast of Scotland. Size and age at previous stages of the life history were calculated from scale measurements. Condition factors and average weights at various periods are considered. 62.7% of the sea-trout migrated as 3-year-old smolts. Rivers in northern Scotland are cold and usually supply less food for fry, which in general results in a longer time spent in fresh water as parr and a lesser average length at the time of migration as smolts than is the case in the rivers of southern Scotland. In any one river there is a tendency for the slower growing, older, and larger smolts, to mature in an earlier post-migration winter than the faster growing, younger, and smaller smolts. Maturity is attained at an earlier age in southern rivers. 2% of the sea-trout spawned in the 1st winter after migration; 61.4% first spawned in the 2d winter after migration, and 34.4% in the 3d winter. Two-fifths of the collection had spawning marks on their scales; 19 had 6 such marks, 9 had 7, 6 had 8, 1 had 9, and 1 had 11 spawning marks. The 4 heaviest clean fish weighed 14 lb., 13½ lb., 11½ lb., and 11 lb. The heaviest kelts weighed 9½ and 9½ lb. The oldest fish was in its 16th year since hatching; the next oldest was one of 15 years (kelt), one of 14½ years and one of 14 years (kelt). Of the 123 sets of salmon scales examined, 60.2% migrated as 2-year-old smolts, and 39.3% migrated as 3-year-old smolts. This high average age at migration is characteristic of the salmon in northwestern Scotland. A

tendency is noted among salmon for the grilse, i.e., the fish which will mature in the 2d post-migration winter, to be shorter at the end of the 1st sea year than the salmon, i.e., the fish which will not mature till the 3d or later winter after migration.—Z. E. Parkhurst.

9060. RODEHEFFER, IMMANUEL A. Experiments in the use of brush shelters by fish in Michigan lakes. Papers Michigan Acad. Sci., Arts and Lett. 24(2): 183-193. 1938 (1939).—Brush piles designed as fish shelters were placed in 6 Michigan lakes to determine to what extent they are used by fish and what size and species of game fish are found in them. At intervals during the summer a large seine was laid around them to form a semicircle with the open part toward shore. Shelters were then pulled shore-ward and the net was carefully drawn along behind. Fish captured were counted, measured, identified and fin-clipped, after which they were returned to the lake. Control areas were seined to note what number and spp. of fish lived in the open areas. The results of seining 62 shelter areas and 47 control areas indicate quite definitely that the young of the game fish, rock bass (Ambloplites rupestris), perch (Perca flavescens), pumpkinseed sunfish (Eupomotis gib-bosus) and small-mouthed bass (Micropterus dolomieu), seek the protection of shelters. Of the forage fish, the bluntnosed minnow (Hyborhynchus notatus) shows a decided preference for such protection. This study merely indicates the effectiveness in concentrating fish in a given area in a

lake.-I. A. Rodeheffer.

9061. Van OOSTEN, JOHN. The age, growth, sexual maturity, and sex ratio of the common whitefish, Coregonus clupeaformis (Mitchill), of Lake Huron. Papers Michigan Acad. Sci., Arts and Lett. 24(2): 195-221. 3 fig. 1938(1939).--The combined samples collected July 3 and 10, 1923, were composed of fish of age groups III-VII, age group IV (1919 year class) predominating. The average standard length was 19.7 in. total length. The samples collected on Nov. 15, 17, and 19, 1924, were composed of age groups III-XII, age group VI (1918 year class) predominating. The avg. length was 23 in. Each year class was exposed to intensive gill-net fishing during 2 successive summers and 2 consecugir-let liming during 2 steeps was the same for the sexes although the \$\foat2\$ tended to be heavier than the \$\displaystyle 3 at corresponding lengths and ages. The whitefish grew 4.5 to 5.5 in. total length during the 1st yr., the yr. of most rapid growth, and in the 8th yr. at a length of 24 in. and a wt. of 4.7 pounds were still growing rapidly in wt. Growth compensation was found. A curve of length-wt. and standard length-total length relationship was shown. Standard lengthlength-total length relationship was shown. Standard length-total length ratios increased with an increase in length of fish. No correlation existed between the coefficient of condition, K, and growth rate. The K values averaged higher in \$2 than in \$3 and in summer than in fall. \$3 reached sexual maturity in their 5th yr. at a length of about 19.3 in. and a wt. of about 2.4 lbs., \$2 in their 7th yr. at a length of 22.1 in. and a wt. of 3.8 lbs. The sex ratio was 50:50 although the \$3 tended to become less numerous than the \$2 with age. \$3 preceded the \$2 on the snawning

than the \$\text{P}\$ with age. \$\text{S}\$ preceded the \$\text{P}\$ on the spawning grounds.—\$\text{J}\$. \$\text{Van Oosten}\$.

9062. WATANABE, M., and J. L. HART. Sex ratio among pilchards on the Pacific Coast of North America. \$Bull. \$Jap. Soc. Sci. Fish. 6(5): 237-239. 1938.—Tagging expts. demonstrate the movement of pilchards between Canadian and southern California waters. There is an annual northward migration in the spring and southward migration in the fall. Larger pilchard migrate farther northward, thus the variation in size increment of large fish of British Columbia and small immature fish off southern California. Sex ratios taken at San Pedro indicate 51.7% \$\,2\, Monterey 51.6% 99, and Vancouver Island 55.7% 99. Females are larger than the $\delta\delta$ in all localities. An excess of 99 among the larger fish suggests a differential mortality with a higher rate for $\delta\delta$.—S. J. Hutchinson.

WILDLIFE MANAGEMENT—TERRESTRIAL

(See also the section "Aves"; and Entries 10288, 10434)

9063. BASS, CHARLES C. Control of "nose-picking" form of cannibalism in young closely confined quail fed raw meat. Proc. Soc. Exp. Biol. and Med. 40(3): 488-489. 1939—When young quail are kept crowded together in

small brooder pens, they develop the "nose-picking" form of cannibalism during the 2d to the 6th or 7th wk. It occurs when the birds are fed any one of several different commercial bird or poultry feeds or other feed mixtures. If. in addition to their other feed, they are given all the raw meat they will eat and a plentiful supply is kept before them all the time, "nose-picking" does not occur, or, if it has already started, it soon stops.—C. C. Bass.

9064. COTTAM, CLARENCE, and PHOEBE KNAPPEN. Food of some uncommon North American birds. Auk 56 (2): 138-169. 1939.—The records of stomach contents of some 239 birds of 47 rare, uncommon, or extinct spp. of N. American birds are summarized and discussed with suitable references to the literature. The following spp. are treated: Gavia adamsi, Colymbus dominicus brachypterus, Diomedea nigripes, Puffinus tenuirostris, P. creatopus, Ardea occidentalis, Ajaia ajaia, Cygnus buccinator, Branta leucopsis, Philacte canagica, Anser brachyrhynchus, Mareca penelope, Nettion crecca, Rostrhamus sociabilis plumbeus, Buteo brachyurus, B. albicaudatus hypospodius, Urubitinga a. anthracina, Haliaeetus albicilla, Falco peregrinus pealei, Ortalis v. vetula, Colinus ridgwayi, Vanellus vanellus, Phaeopus borealis, Aethia pygmaea, Columba leucocephala, Ectopistes migratorius, Leptotila fulviventris angelica, Conuropsis c. carolinensis, Rhynchopsitta pachyrhyncha, Cuculus optatus, Coccyzus minor maynardi, Nyctidromus albicollis merrilli, Eugenes fulgens, Lampornis clemenciae bessophilus, Hylocharis l. leucotis, Cynanthus latirostris, Trogon a. ambiguus, Campephilus principalis, Myiodynastes luteiventris swarthi, Myiarchus tuberculifer olivascens, Empidonax fulvifrons pygmaeus, Xanthoura luxuosa glaucescens, Toxostoma longirostre sennetti, Sialia sialis fulva, Oenanthe o. oenanthe, Passerculus r. rostratus, Aimophila b. botterii. All the material upon which this paper is based is on file in the Section of Food Habits of the U.S. Bureau

of Biological Survey.—P. Knappen.

9065. COTTAM, CLARENCE. Food habits of North American diving ducks. U. S. Dept. Agric. Tech. Bull. 643. 1-139. 10 pl. 1939.—To return to a satisfactory abundance the duck population, which has decreased alarmingly in recent years, owing in part to drought, reclamation, and overshooting, it is necessary effectively to apply principles of conservation and restoration. To do this, a knowledge of the food requirements of the species is requisite. This bulletin treats of the food habits of the 22 N. American diving ducks (exclusive of mergansers), which may be roughly segregated as inland divers and sea ducks. It is based both on field studies and on the analyses in the Food Habits Laboratory of the Biol. Survey of the stomach contents (including both gizzard and gullet) of 6,665 adults and 141 juveniles. For each species there is a summary of distribution, habits, and status, along with detailed data on food preferences. Food percentages were computed by the volumetric method. The inland divers include the redhead, ringneck, canvasback, greater and lesser scaups, ruddy duck, and the masked duck. With the exception of the greater scaup, which consumes nearly equal proportions of plant and animal food, all are predominantly vegetarians, feeding on tubers, underground rootstalks, seeds, and green vegetative fibers of many aquatic and marsh plants. The sea ducks include the American and Barrow's goldeneyes, bufflehead, old squaw, and harlequin duck; the eiders-Steller's northern, American, Pacific, king, and spectacledand the scoters-white-winged, surf, and American. All of these are predominantly animal feeders. For the inland divers, few plants appear to be of outstanding value as food. Most important are the submerged pondweeds (Najadaceae), wild celery (Vallisneria spiralis), musk grass (Characeae), watershield (Brasenia schreberi), wild rice (Zizania aquatica), bulrushes (Scirpus), and smartweeds (Polygonum). The most important animal foods are mollusks and insects-particularly caddis fly and midge larvae, water bugs, and water beetles. A section of the bulletin treats of methods of propagating desirable duck foods. For the sea ducks, mollusks (mostly pelecypods, especially $Mytilus\ edulis$) were the most important food for 8 species, crustaceans for 4, and insects for 2. Fishes are acceptable to all the spp. treated but were consumed in small numbers, and the kinds taken are rarely of com-

mercial or sporting importance. Within limits, availability is the most important factor governing food selection. When an acceptable food is found the adults often make their entire meal on a single or a related group of species. The young of most spp. fed principally upon animal foods, mainly insects, crustaceans, and small mollusks, although some juveniles showed a decided, though indiscriminate, preference for vegetable material.—C. Cottam.

9066. ERRINGTON, PAUL L. Foods of bob-white in

Wisconsin. Auk 56(2): 170-173. 1939.—Bob-white (Colinus virginianus) food habits in north-central U.S. in the warmer months are illustrated by data from a series of 58 stomachs collected in southern Wisconsin between Apr. and Nov., 1930 and 1931. Seasonal changes in diet were closely associated with relative availability of food types, vegetable matter being taken in far greater quantities than animal except during early growth stages of the young birds.—P. L. Errington.

9067. GIRARD, G. L. Life history, habits, and food of the sage grouse (Centrocercus urophasianus Bonaparte). Wyoming Univ. Publ. 3(1/2): 1-56. 20 fig. 1937.—The sage Wyoming Univ. Publ. 3(1/2): 1-50. 20 ng. 1951.—1 ne sage grouse is found in only 8 states and is the leading game bird in Montana, Wyoming, Idaho, and Colorado. An investigation of its life history, habits, and food is reported, the details being given in tables.—Courtesy Exp. Sta. Rec. 9068. GRISCOM, LUDLOW. The ring-necked duck as a

transient in the northeastern states. \overline{Auk} 56(2): 134-137.

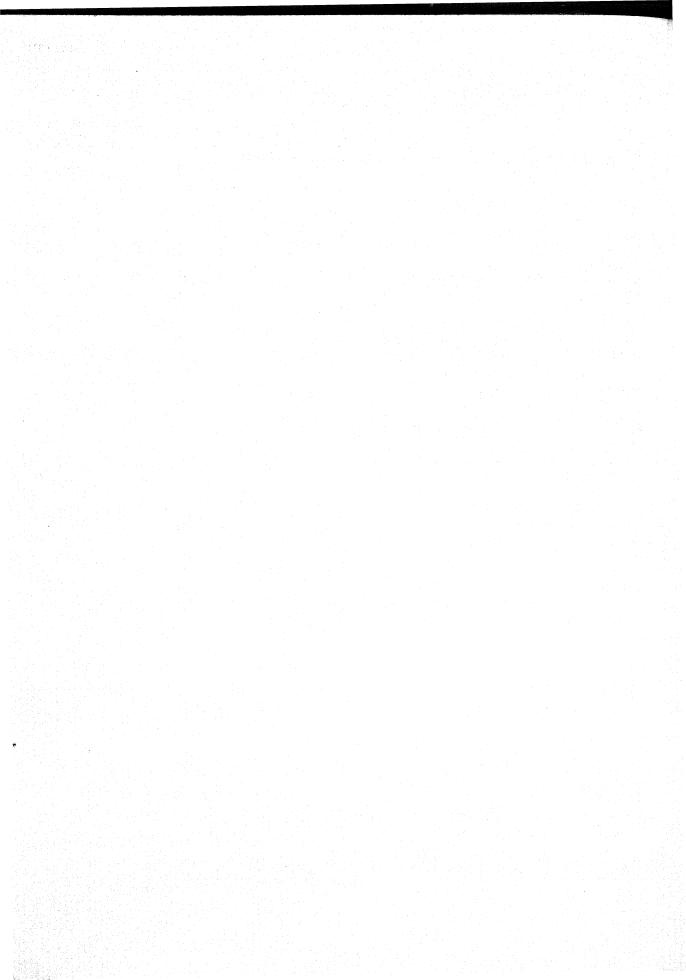
1939.—Nyroca collaris.

9069. McATEE, W. L. Wildlife of the Atlantic coast salt marshes. U. S. Dept. Agric. Circ. 520. 1-28. 6 pl., 10 fig. 1939.—This circular is revised from material previously distributed in mimeographed form for educational purposes, particularly in CCC camps engaged in conditioning areas as refuges for migratory waterfowl. It urges conservation standards and doing what is necessary but no more when readjusting wildlife and its environment. The gradual sinking of the Atlantic coast is favorable to the formation of salt marshes and provides conditions suitable for the zones

of vegetation, which are described. Individual accounts intended to facilitate recognition, and including matters of popular interest, are given for the common plants, birds, reptiles, fishes, and mammals of the salt marshes.-McAtee.

9070. MARTIN, A. C., and F. M. UHLER. Food of game ducks in the United States and Canada. U. S. Dept. Agric. Tech. Bull. 634, 1-156, 153 pl., 137 fig. 1939.—Designed to provide information helpful in the development or improvement of waterfowl habits and to reduce unnecessary expenditures on wasteful attempts to introduce plants into unsuitable environments, this bulletin is divided into 3 parts, each contributing practical information on an important phase of waterfowl-food production and use: Part 1, "Regional data on duck foods," includes tables of data on the principal foods in 8 regions of the U.S. and Canada. Within each region the figures on food use have been based on locality units (247 in all) graded according to their representation by duck stomachs. Part 2, "Principal duck foods: their identification, value, and range," treats descriptively more than 200 food items, in systematic order. The 123 text maps indicate the general known range of the plants and in many instances depict areas of greatest abundance, isolated occurrence, and districts of uncertain distribution. Part 3, "Propagation of waterfowl food plants and development of feeding grounds," presents practical suggestions on harvesting, storage, germination, shipment, and planting and treats in some detail the principal factors, favorable and otherwise, influencing growth.—A. C. Martin.

9071. PRELL, H. Skandinavische Wildrinder in historischer Zeit. Zool. Anz. 125(7/8): 203-208. 1939.—A statement was made by Adam von Bremen in 1076 that in Scandinavia wild game was so abundant that the people scandinavia wild game was so abundant that the people subsisted on it. The pertinent words in the original Latin are uri, bubali, and elaces, usually translated as oxen, buffalo, and elk. A. believes that uri really refers to the guillemot (*Uria*), elaces to the auk (*Alca*) and bubalus to another bird, the puffin.—*L. H. Hyman*.



PALEOBOTANY

EDWARD W. BERRY, Editor

10095. ARNOLD, C. A. Lagenospermum imparirameum sp. nov., a seedbearing fructification from the Mississippian of Pennsylvania and Virginia. Bull. Torrey Bot. Club 66 (5): 297-303. 10 fig. 1939.—Cupulate fructifications of the Calathiops type are borne terminally on slightly unequally bifurcated branch tips. Each cupule contains 1 oval seed which is enclosed except at the tip by a whorl of 5 basally joined acicular bracts. The fructifications probably belong to the Lyginopterideae. They are associated with Cardiop-

to the Lyginopteriotee. They are associated with Caracopteridium foliage.—C. A. Arnold.

10096. BROWN, ROLAND W., and EDGAR HOULDS-WORTH. The fruit of Trapa? microphylla Lesquereux. Jour. Washington Acad. Sci. 29(1): 36-39. 9 fig. 1939.—The first specimens with fruit attached are reported. They were found by Hauldsmorth in the Bayensgrag formation. found by Houldsworth in the Ravenscrag formation (Paleocene) of southern Saskatchewan, Canada. Neither the fruit nor the leaves of this species are like those of living species of *Trapa*; but a similar hydrophytic habitat

is indicated.—Authors.

10097. MÄGDEFRAU, KARL. Die Flora des Oberdevons im östlichen Thüringer Wald. Beih. Bot. Centralbl. Abt. B. 56(1/2): 213-228. 2 pl., 3 fig. 1936.—The Volk collection of fossil plants from the Upper Devonian of East Prussia contains the first definitely determinable plants of the Thuringen Devonian. All the plant fossils occur as impressions. The great majority of the determinable fossils belong to Cyclostigma which is represented by 3 spp.: C. kiltorkense, C. dasyphyllum, and C. wijkianum. Other fossils found are: Helionella theodori, Pseudobornia ursina, and Sphenopteribella in the statement of the sediment of the sediment of the sediment. dium keilhaui. The petrography of the sediments and biostratonomic relations of the lowermost Upper Devonian in the east Thuringen forest indicate coastal deposits. All the previously known plants of this formation are listed by taxonomic groups giving the place of discovery and by whom and when reported. No examples of clearly defined annual rings in the Upper Devonian woods have been observed up to the present.—H. F. Bergman.

10098. SCHOPF, JAMES M. Medullosa distelica, a new

species of the Anglica group of Medullosa. Amer. Jour. Bot. 26(4): 196-207. 16 fig. 1939.—M. distelica and petioles. leaflets and roots associated with it are descr. The stem possesses 2 highly asymmetric (endocentric) steles. The asymmetrical growth of the steles, leaf tract accompaniment of secondary wood and the location of protoxylem in the stem are compared with other Medullosan species. The Medullosa "form-cycles" are discussed briefly. Older species, which include the M. anglica "form-cycle" and American forms, are grouped in a new subgenus (ANGLOROTA). A specimen studied earlier by Reinhardt Thiessen is described as M. anglica var. thiesseni. Thiessen's specimen was the first stem reported from America and it shows how closely the American and European species are related.—J. M. Schoof.

10099. SMITH, HELEN V. Additions to the fossil flora of Sucker Creek, Oregon. Papers Michigan Acad. Sci., Arts and Lett. 24(1): 107-120. 7 pl. 1938(1939).—30 spp. of Miocene plants are listed; of these 11 have not been previously reported from Sucker Creek. Ulmus owyheensis is described, and 1 new comb.. Oreopanax dissecta (Lesq.), proposed.-

H. V. Smith.

10100. SZAFER, WŁADYSŁAW. The endocarps of Celtis from the Miocene in Poland. [In Polish with Eng. summ.] Acta Soc. Bot. Polon. 15(1): 47-51. 1 pl. 1938.

10101. SZAFER, WŁ. Eine pliozäne Flora in Krościenko am Dunajec. Bull. Internat. Acad. Polonaise Sci. et Lettr. Cl. Sci. Math. et Nat. Sér. B: Sci. Nat. (1) [Bot.] 1938(1/5): 81-90. 4 pl., 60 fig. 1938.—The author describes a rich find of fossilized material in the clay of some brickyards near Krościenko in the Carpathian mountains which is of extraordinary scientific interest The material includes pieces of wood and twigs of trees and shrubs, many fruits and seeds, leaves, leafy mosses and pollen grains of forest trees representing a rich tertiary flora. Listed are 4 mosses, 7 conifers, 26 choripetalous dicotyledons, 6 sympetalous dicotyledons and 4 monocotyledons. The fossil flora of Krościenko, as every other pliocene flora of middle Europe. shows the characteristic mixture of species, also a distinct relationship with the pliocene flora of Bulgaria and the Russian tertiary flora of Woronesch and Tomsk. The pliocene flora of Krościenko belongs to the Middle Pliocene. -M. C. Bliss.

10102. WOŁOSZYŃSKA, JADWIGA. Über eine pleistocane Nitella von Ściejowice bei Kraków. [In Polish with Ger. summ.] Acta Soc. Bot. Polon. 15(1): 23-26. 1 pl. 1938.—

Nitella hyalina var. sciejourcensis*.

ALGAE

(See also in this issue Entries 9048, 10102, 10305)

10103. HÄMMERLING, JOACHIM. Über die Bedingungen der Kernteilung und der Zystenbildung bei Acetabularia mediterranea. Biol. Zentralbl. 59(3/4): 158-193. 8 fig. 1939. -The single diploid primary nucleus near the rhizoid base gives rise to secondary nuclei which increase by mitosis. A plasma streaming sets in which carries the nuclei up the stem to the hat where the appearance of white flecks precedes the definitive cyst-formation in the chambers. From zygote to cyst formation requires about 7 to 9 mo. and from hat an lage to cyst formation often takes 3 mo. Regeneration and transplantation expts. show that nuclear division can be delayed or be brought on precociously. The essential condition for nuclear division is some physiological state which depends upon the presence of a maximal hat (diam., 0.55-1.12 cm). The increase of secondary nuclei, the plasma streaming and cyst formation also depend upon the presence of a maximal hat. The nucleus through the elaboration of formative substances contributes to a division promoting environment which in turn reacts upon the nucleus.—A. H. Hersh.

10104. HUBER-PESTALOZZI, G. Anabaena minderi, eine neue Anabaena-Art. Arch. Hydrobiol. 34(1): 140-142. 1 pl. 1938.—From the plankton of the Greifensee, Canton Zurich.

KLEBAHN, H. Zwei nichtgrüne Algen des 10105. Süswassers. Beih. Bot. Centralbl. Abt. A. 59(1/2): 173-187. 11 fig. 1939.—A brown alga, LITHODORA lacustris (incertae sedis in Phaeophyceae), resembling Coleochaete scutata in structure and in manner of spread is described. Reproductive organs, chromatophores or nuclei were not seen. SELKIA lacustris, incertae sedis in Rhodophyceae, similar to C. pulvinata or a young Chaetophora, has creeping filaments extending horizontally in different directions; from these filaments short branches grow upwards forming irregular clumps. The cells are cylindrical with rounded corners and contain chromatophores which may be in the form of granules, plates or short bands. Reproductive bodies were not found.—H. F. Bergman.

10106. MOEWUS, FRANZ. Volvocales-Literaturverzeichnis. 1. Nachtrag: 1932-1937. Beih. Bot. Centralbl. Abt. A. 59(1/2): 225-234. 1939.—A supplement to the list of references on the Volvocales published [see B. A. 10(6): entry 14257]. The present list includes 98 publications among which are 7 which appeared before 1932. All spp., vars., and forms which have been described as new are included.—H. F. Bergman.

10107. PRINGSHEIM, E. G., und K. ONDRAČEK. Untersuchungen über die Geschlechtsvorgänge bei Polytoma. Beih. Bot. Centralbl. Abt. A. 59(1/2): 117-172. 1939.—Copulation in *Polytoma* is described. The kind of sexuality found is the most primitive known. Morphologically and cytologically the uniting cells are alike; they, and the vegetative cells also, divide on transfer to fresh nutrient soln. Thus the nature of the "gametes" expresses itself only by their behavior in copulation in which group formation and irritability play a part. It was not possible, in any Polytoma stock, to bring about zygote formation in cells transferred from agar to water as Moewus described. If drops containing zoospores, taken from reagent glasses after the copulation period, were united by pairs copulation occurred in a certain proportion of cases, but no bipolar scheme could be seen in the apparently resting gametes (RG) as should be the case on the assumption of bisexuality. In single drops, also, copulation could be restored. By improvement of the

conditions for cell fusion all the cells of the culture could be made to copulate so that no RG remained. Theoretical considerations indicate that any other result was hardly to be expected, and that the RG theory in its present form embodies many obscurities and is not consistent with the assumption of 2 chemically active sex substances, particularly such as those of a relative sexuality. Only a few of the other forms studied by Moewus could be investigated; the stocks concerned were mostly not obtainable. In monoecious Protosiphon zygote formation was obtained but no RG. In Chlamydomonas simplex and C. eugametos no copulation was obtained.—Auth. summ. (tr. by H. F. Bergman).

FUNGI

Editor: C. L. SHEAR. Associate Editor: EDITH K. CASH

(See also in this issue Entries 9025, 9048, 9924, 9976, 9977, 9978, 9979, 9981, 10035, 10059, 10321, 10371, 10457)

FUNGI

10108. BAXTER, DOW V., and WALLACE E. MANIS. Polyporus ellisianus (Murr.) Sacc. & Trott. and Polyporus anceps Pk. in culture: A study of isolates from widely separated forest regions. Papers Michigan Acad. Sci., Arts and Lett. 24(1): 189-196. 3 pl. 1938(1939).—The fungus in the southwestern ponderosa pine region often referred to as "Polyporus ellisianus" usually fruits on prostrate logs and less frequently on down timbers off the ground. This fungus causes a common rot of ponderosa pine and, in the southwest at least, causes more decay than does Fomes pini, which is so prevalent on western conifers elsewhere. The fungus known as P. anceps in the eastern N. America fruits on fallen logs and is usually found on high stumps and standing snags. It is frequent in black spruce in the Northwest Territories. In eastern conifers it has not been considered to be prevalent enough to cause much decay. This paper compares 8 isolates in culture of western and eastern collections. Northern North American is represented by an isolate from Ft. Wrigley, Northwest Territories. Variations exhibited in culture are as great as any morphological distinctions that can be detd. from field collections.—D. V. Baxter.

10109. BISBY, G. R., with the collaboration of A. H. R. BULLER, JOHN DEARNESS, W. P. FRASER, and R. C. RUSSELL. The fungi of Manitoba and Saskatchewan. 189p. Map, 13 pl. National Research Council of Canada: Ottawa, Canada, 1939. Pr. \$3.50.—This is an expansion of "The Fungi of Manitoba" (Biol. Abs. 5: entry 1785) including about double the text. The fungi known from Saskatchewan (600 spp.) are now included in the total of 2,782 fungi recorded (21 of these in an Appendix). Notes are given for most spp., including spore-size and other data. A Host-Index is included and a Bibliography of 254 titles, all but 17 of which refer to mycological papers published in Manitoba and which refer to mycological papers published in Manitoba and Seskatchewan to the end of 1936. A Preface was contributed by H. T. GUSSOW. The Map gives the soil and vegetation zones of the 2 Provinces. The Plates illustrate spp. of Coprinus (44 figs.) and the landscape of Manitoba and Saskatchewan (5 figs.). The Introduction gives an accelerate of the functor flow considered from unions with analysis of the fungus-flora considered from various points of view. Reference is made to the numerous Canadian fungi studied and illustrated by Buller and various other workers. One new species is included, Cercospora haleniae Chupp and Bisby.—G. R. Bisby.

10110. CAMPBELL, A. H. On the "sclerotium" of Collybia fusipes (Bull.) Berk. Trans. Brit. Mycol. Soc. 22 (3/4): 244-251.1 pl. 1939.—On basis of field observations and cultures it is shown that the black bodies from which the fructifications arise, previously referred to as "sclerotia" and "perennial pseudorhizae," are in reality extensions of mycelial masses immersed in the substratum and surrounded

by dark hyphal plates, properly designated as pseudo-sclerotia.—G. W. Martin. 19111. COUCH, JOHN N. A new Conidiobolus with sexual reproduction. Amer. Jour. Bot. 26(3): 119-130. 53 fig. 1939.-C. brefeldianus is characterized by its delicate growth, small conidia, and small zygospores. It is culturable on a great variety of plant and animal substrata and can parasitize certain insects. On favorable nutrient material conidia are formed in continuous darkness or continuous light. The number of conidia is greatly increased on any favorable

culture media by exposing the culture to alternating daylight and darkness. Conidium formation is rapid, the whole process taking from 50 min. to 2 hours. When mature, the considium hurls itself horizontally for 5 to 12 mm. by the sudden out-pushing of the papilla. This force acts against the cone-shaped columella. The turgor of the conidiophore is maintained by a conspicuous vacuole, and if the latter is plasmolized, the conidium fails to get away. Sexual replasmolized, the condition fails to get away. Sexual reproduction occurs on a great variety of culture media but is most abundant in media relatively rich in peptone. The ripe zygote has a large eccentric fat(?) globule and whitish cytoplasm surrounded by a three-layered(?) wall. The zygote may germinate after about 2 weeks' rest but will retain its vitality for at least 6 months.—J. N. Couch.

10112. FAWCETT, STELLA G. M. Studies on the Australian Clavariaceae. 1. Proc. Roy. Soc. Victoria 51(1): 1-20. 5 pl. 1939.—Of 10 selected spp. of Clavaria, only one (C. complanata) grows on the ordinary culture media. The family description is emended to include one parasitic species, C. tochinaiana. Coker's classification of the genus is adopted, and groups 3, 4, 7, 8, 9, are dealt with. A new sp. and a n. var. are descr., and several changes in synonymy

published.—S. G. M. Fawcett.

10113. JENKINS, WILBERT A. The development of Mycosphaerella berkeleyii. Jour. Agric. Res. 58(8): 617-620. 1 pl. 1939.—The details of structure and development of the spermogonia and perithecia of *M. berkeleyii* differ from those of *M. arachidicola*. The principal differences are: more stroma surrounding the fruit bodies, longer sterigmata on the spermatial mother cells, more archicarps in the young perithecia, more fertile tissue in the base of the perithecium, origin of periphyses and the tardiness of ascospore discharge in *M. berkeleyii*. The 2 fungi also produce different symptoms on their mutual host, and differ in type of conidial fructifications, host relationships, culture characteristics and size of ascospores.-W. A. Jenkins.

10114. KARLING, J. S. Studies on Rhizophidium. III. Germination of the resting spores. Bull. Torrey Bot. Club 66(5): 281-286. I pl. 1939.—The resting spore of Rhizophidium sp. functions as a prosporangium in germination. The contents grow out through a small germ pore and form a thin-walled, hyaline zoosporangium on the surface of the spore. Its exit papilla ruptures at maturity emitting hyaline, posteriorly uniciliate goospores in the same manner as the posteriorly uniciliate zoospores in the same manner as the

primary evanescent zoosporangia.—J. S. Karling.
10115. McLARTY, D. A. Observations on the genus
Pseudolpidium. Amer. Jour. Bot. 26(4): 194-195. 17 fig.
1939.—Resting-spores of P. saprolegniae and P. fusiforme
were found in swollen filaments of Achlya collected at London, Canada; zoosporangia and asexual resting-spores of the type described by Butler for certain spp. of this genus were observed along with sexual resting-spores of the type described for *Olpidiopsis*. The spiny bodies, described by Fischer as resting-spores, proved to be merely bristly zoosporangia; and monospore cultures indicated that the structures which he observed are modifications of the zoosporangium of a single species. The resting-spore is spherical, spiny, thick-walled and in most cases develops asexually. In pure culture, however, a few sexual resting-spores are regularly observed.—The nature of the resting-spore is evidently not a suitable character upon which to base generic

distinctions. This form is considered as a species of Pseudolpidium which exhibits some sexuality. Investigations now in progress may serve to explain the nature of sex in this species. Careful studies of sexual expression in all species must be made to determine the validity of the genera Pseudolpidium and Olpidiopsis.—D. A. McLarty.

10116. FREY, ED., and I. MACKENZIE LAMB. A new species of Umbilicaria from the Antarctic. Trans. Brit. Mycol. Soc. 22(3/4): 270-273. 2 pl. 1939.—U. antarctica from South Orkneys and var. subvirginis* from South Victoria Land.-G. W. Martin.

10117. HEDRICK, JOYCE. Lichens from British Honduras collected by E. B. Mains. Papers Michigan Acad. Sci., Arts and Lett. 24(1): 9-16. 2 pl. 1938(1939).—A list of 41 spp. and 8 subspp. collected in the El Cayo District, with descriptions of new spp. in Arthoniopsis, Sporopodium, and Calenia (1 each).—J. Hedrick.

SPERMATOPHYTA

FRANCIS W. PENNELL, Editor

(See also in this issue Entries 8870, 8886, 8906, 9008, 9069, 10100, 10168, 10192, 10229, 10237, 10272, 10466)

GYMNOSPERMAE

10118. MEZERA, ALOIS. O rozšíření šiškových forem smrku v ČSR. [Geographic distribution of cone-forms of spruce in the natural forests of Czecho-Slovakia.] [With Ger. and Fr. summ.] Lesnická Práce 18(1/2): 35-60. 8 fig. 1939.—On the basis of the form of the cone scales, the following forms of Picea excelsa (P. abies) are recognized: P. e. v. obovata f. transversa, f. typica, f. fennica; P. e. v. europea f. cuneata, f. typica, f. biloba, f. triloba; P. e. v. acuminata f. apicula, f. ligulata, f. typica, f. squarrosa. V. obovata f. fennica is more abundant in the Sudetens than in the Carpathians although it does not form a large % of the spruce forest anywhere; v. europea occurs throughout the country as far east as the Slovakian beech region; east of there v. acuminata is the most abundant. Size of cones decreases with increase in altitude and also varies with longitude.-W. N. Sparhawk.

SPERMATOPHYTA (MIXED)

10119. TURRILL, W. B. On the flora of the Nearer East. XVIII. Bull. Miscell. Inform. Kew 1937(2): 79-86. 1937.— Glycyrrhizopsis syriaca, from west of Antioch; Salvia teddii from W. Thrace, and Ornithogalum alatum from W. Thrace are new. Extensions of known geographical distributions are recorded for: Lythrum hispidulum, from W. Thrace; Vinca difformis, from west of Antioch; and Paspalum distichum from S. Macedonia. Pollen from trees of Abies borisii-regis was overwhelmingly "good," showing no more than 2-3% of shrunken and collapsed grains; this evidence does not support the view of an interspecific hybrid origin of the plants examined.—W. B. Turrill.

MONOCOTYLEDONES

10120. BURKILL, I. H. The races of Sorghum. Bull. Miscell. Inform. Kew 1937(2): 112-119. 1937.—A review and a phytogeographic analysis of J. D. Snowden's Cultivated Races of Sorghum (London, 1936). Snowden indicates 3 or 4 wild African spp. of Sorghum as the parents of the 31 cultigens which he describes: the reviewer, using Snowden's data, suggests the relative age of some of the species and the course of their dissemination, particularly the transport of one type after another from Africa to Asia, followed by further divergent evolution. He points to an early inter-change across the Indian Ocean of useful plants by the activity of mariners whose records have in the main yet to be collected.—I. H. Burkill.

10121. BURRET, M. Neue Palmen aus Neuguinea. III. Zugleich Palmen von den Salomo-Inseln. Notizbl. Bot. Augueich Falmen von den Salomo-Insein. Notizol. Bot. Gart. u. Mus. Berlin-Dahlem 13(116): 65-101. 1936.—A taxonomic paper concluding the treatment of the palms collected by L. J. Brass on the Archbold New Guinea Expedition. The collections mostly came from the Solomon Islands. To these are added other collections by J. H. L. Watcheuse from Bourginville Island. New Spin and defined the supplier of the collections by J. H. L. Waterhouse from Bougainville Island. New spp. are dewaterhouse from Bougainville Island. New spp. are described in Orania, Heterospathe, Ptychosperma; new vars in Areca, Calyprocalyx, and Gulubia. The new genera are, PARAGULUBIA related to Gulubia and Adelonenga, REH-DEROPHOENIX related to Ptychandra, STRONGYLO-CARYUM related to Ptychosperma.—H. St. John.

10122. DAUBENMIRE, R. F. The taxonomy and ecology of Agropyron spicatum and A. inerme. Bull. Torrey Bot. Club 66(5): 327-329. 1939.—A. inerme is reduced to a var. of

A. spicatum because of the complete intergradation of the awn character which is the only distinguishing characteristic. Furthermore, the 2 grasses have identical and unusual (for Agropyron) ecological response to environment: in drier habitats both are true bunchgrasses but on favorable sites both form a sod and fruit less prolifically.—R. F. Daubenmire.

10123. WEATHERWAX, PAUL. The morphology and phylogenetic position of the genus Jouvea (Gramineae). Bull. Torrey Bot. Club 66(5): 315-325. 11 fig. 1939.—The morphology of the characteristic thorn-like pistillate structure of J. pilosa and J. straminea indicates that it is a spikelet rather than a spike. The pistillate flowers are imbedded in a thickened rachilla, and each flower is covered by a tubular lemma. The palea is small but distinct. The pistillate flower has 3 rudimentary stamens, but no trace of a pistil has been found in the staminate flower. The interpretation of the pistillate unit as a spikelet, which is correlated with some other features not characteristic of the Hordeae, indicates that Jouvea should be removed from that tribe. It is probably best placed in the Festuceae. The study was based on microtome sections and gross dissection of herbarium material collected on the Pacific coast of Guatemala.-P. Weatherwax.

DICOTYLEDONES

10124. ALLAN, H. H. A note on the horned poppy in New Zealand. Bull. Miscell. Inform. Kew 1937(8): 409-411. 1937.—The population of Glaucium flavum on Miramar Peninsula was investigated and scored according to Turrill's scheme [see B. A. 9(8): entry 16784]. It was found to be constant in the area and similar to the populations described by Turrill from Hurst Castle, Hants. England, and from Caneé, Crete.—J. S. L. Gilmour.

10125. BAUSCH, J. A revision of the Eucryphiaceae. Bull. Miscell. Inform. Kew 1938(8): 317-349. 1938.—The taxonomy of the Eucryphiaceae is fully discussed from as many aspects as possible. The following are the most important points that emerge:—(1) The floral characters of the different spp. are very uniform. The most important diagnostic features of the flowers are the hairiness of the every, the length of the peduncle and the number of bracts. (2) Both simple and compound leaves occur. (3) Hybrids are recorded, either in nature or in cultivation, for all species except E. moorei. (4) The distribution of the species is interesting. Two spp. occur in Chile, confined to the sub-tropical and temperate rain forest. E. glutinosa (compound leaves) is a lowland tree or shrub, E. cordifolia (simple leaves) extends up the mts. to the level of the glaciers. The other species are Australian, the compound-leaved species occurring in the subtropical rain forests of the continent, and the 2 simple-leaved spp. and their hybrid in Tasmania.

(5) The family is considered to be taxonomically most nearly related to the Cunoniaceae. This conclusion is based on morphological characters and on similarity of anatomical structure, especially on the occurrence of both simple and scalariform perforations in the vessels in the two families. Similarity in chemical properties also points to the same relationship.—J. Bausch.

10126. BULLOCK, A. A. Contributions to the flora of Tropical America. XXIX. The genus Periptera. Bull. Miscell. Inform. Kew 1937(2): 75-78. 1937.—A brief account

of the history of this Mexican Malvaceous genus is followed by a key and enumeration of the four species recog-

nised.—J. S. L. Gilmour.

10127. BURRET, M. Eine neue Myrtaceen-Gattung von Celebes. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 13(116): Celebes. Notizbl. Bot. Gart. v. Mus. Bertan-Dantem 13(116): 101-106. 1936.—The new genus KJELLBERGIODENDRON, with 2 spp. from the Celebes. It is in the Myrtoideae close to Jambosa.—H. St. John.
10128. CROIZAT, L. Euphorbia (Diacanthum) Deightonii, a new succulent from West Africa, with brief notes on some allied species. Bull. Miscell. Inform. Kew 1938

(2): 53-58. 1938.

10129. DIELS, L. Menispermaceae americanae. Notizbl. Bot. Gart. v. Mus. Berlin-Dahlem 13(116): 27-29. 1936.— New species in the following genera are described: 3 in Odontocarya from Equador or Colombia; 1 in Disciphania from Brasil; and 1 in Abuta from British Guiana.—H. St. John.

10130. EASTWOOD, A. Perennial lupines of the Pacific states. II. Leaflets of Western Botany 2(10): 180-183. 1939.

—Continuation of the revision of Lupinus Sect. Polyphyllii, with 1 new species and 1 new combination (California).—

L. Constance.

10131. FASSETT, NORMAN C. The leguminous plants of Wisconsin. The taxonomy, ecology, and distribution of the Leguminosae growing in the state without cultivation. With drawings by RICHARD I. EVANS, and a study of epidermal outgrowths by CATHERINE MOSE. xii + 157p. Frontispiece, 24 pl., 59 fig. University of Wisconsin Press: Madison, 1939. Pr. \$3.—A general taxonomic treatment of the native and naturalized Leguminosae known to occur in Wisconsin, copiously illustrated by specially prepared photographs, drawings, and distribution maps. The work is made more generally useable and useful by the incorporation of an artificial key to species based on vegetative characters, a key to genera based on the flowers, another key to the genera based on the fruits, a key to the genera and some species based on the seeds, and finally a key to species and some genera based on epidermal outgrowths which are figured. Species descriptions are, in general, not provided

but many critical notes on habitats, distribution, distinctive and special characters, ecology, etc. are given.—E. D. Merrill.

10132. GILG, CHARLOTTE. Heterophyllie bei Capparis Bussei. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 13(116): 30-34. 1936.—A discussion of Capparis bussei of E. Africa, which produces from suggestive under first subsectile circle. which produces from successive nodes first subsessile simple leaves, then from the next one long petioled ternate leaves.-

H. St. John.

10133. GILMOUR, J. S. L. Notes on the genus Centaurium. I. The nomenclature of the British species. Bull. Miscell.

Inform. Kew 1937(10): 497-502. 1937.

10134. GREEN, M. L. The correct name of the yellow hybrid aster. Bull. Miscell. Inform. Kew 1937(6): 350-352.

1937.—The correct name is shown to be Solidaster luteus (Everett) M. L. Green.—J. S. L. Gilmour.

10135. HITCHCOCK, C. L. Notable western plants. I. Leaflets of Western Botany 2(10): 177-180. 1939.—Miscellaneous observations on Kelseya, Lepidium, Draba and

Reverchonia.—L. Constance.

10136. HOWELL, J. T. Plants worthy of note. IV.

Leaflets of Western Botany 2(10): 183-186. 1939.—Notes
on Sedum, Velaea and Nemacladus, with proposed new var.
in Velaea (California).—L. Constance.

10137. HUMBERT, H. Un genre archaique de cucurbitacées de Madagascar. Compt. Rend. Acad. Sci. [Paris] 208(3): 220-222. 1939.—2 n. spp. of Xerosicyos.

10138. MARQUAND, C. V. B. A new cotoneaster from Tibet. Bull. Miscell. Inform. Kew 1937(2): 119-120. 1937.

10139. MARSDEN-JONES, E. M., and W. B. TURRILL. Researches on Silene maritima and S. vulgaris. XVII. Genetical investigation of a Welsh mountain plant. Bull. Miscell. Inform. Kew 1937(1): 45-53. 4 pl. 1937.—The results are given of selfing a mountain plant from Wales and of crossing it with typical S. maritima and S. vulgaris. In the majority of its characters the Welsh plant agreed with the generally accepted diagnostic characters of S. maritima. In several aberrant characters (foliage, corona, and calyx) previous contamination with S. vulgaris was suggested. Alternatively, the aberrant characters might

represent more ancient phenotypic combinations than now usually found in coastal populations of S. maritima. Analyses of the following characters and organs and their genetical behavior are given: habit, indumentum, leaves, inflorescence, calyx, corolla (overlapping of petals and segments, depth of lobing, degree of lobing, corona, petal blotch), sex, filaments, anthers, stigmata, immature seeds, fruits, and mature seeds.—Authors.

10140. MARSDEN-JONES, E. M., and W. B. TURRILL. Researches on Silene maritima and S. vulgaris. XVIII. Selfings of two plants of S. vulgaris from Bulgaria and the results of crossing one with English S. maritima. Bull. Miscell. Inform. Kew 1937(5): 310-318. 5 pl. 1937.— The genetics of 2 stocks of S. vulgaris from Bulgaria are investigated by selfings and by crossings, one of them with English S. maritima. The 2 Bulgarian plants showed little segregation on selfing. On crossing S. maritima (narrow leaved) from Dorset with the very broad-leaved S. vulgaris decided (but partial) sterility was shown in F1 and in F2. Considerable segregation occurred in the F₂ families. A predominating influence of the ovule parent was shown for stem length. Only 2 plants out of 127 had foliage of the S. maritima grand-parental type; 125 showed various intermediate shapes, the figures suggesting that 3 or more gene pairs were involved. Segregation also occurred for indumentum, callyx-shape, petal characters, sex, and capsule shape. The plants bred true for armadillo seeds even in the interspecific cross and its offspring. The segregation for anthocyanin development in different organs suggested the interaction of 3 factor pairs, 2 dominants of which are essential for the production of color.—W. B. Turrill.

10141. MARSDEN-JONES, E. M., and W. B. TURRILL. Researches on Silene maritima and S. vulgaris. XIX. Analysis of a wild population of S. vulgaris from the coastal cliffs of Somerset. Bull. Miscell. Inform. Kew 1937(8): 432-436. 1937.—The Analysis showed various distinctive features of the population (e.g., high development of anthocyanin in the vegetative parts and calyces), probably caused by habitat conditions unusual for this species. Variation was, however, within the specific limits of S. vulgaris. S. vulgaris, in the absence of S. maritima, can retain its specific features when growing in a maritime cliff

habitat.—J. S. L. Gilmour.

10142. MARSDEN-JONES, E. M., and W. B. TURRILL. Researches on Silene maritima and S. vulgaris. XX. The genetics of an Austrian mountain plant. Bull. Miscell. Inform. Kew 1937(10): 481-492. 1937.—The results are given of crossing a plant from the Eastern Alps (designated C.1) with British stocks of S. vulgaris and S. maritima. Considerable sterility was shown by some of the crosses and selfings—especially when S. vulgaris was used as a 2d parent. C.1 shows characters of both S. vulgaris and S. maritima and the question of its taxonomic position will be reserved till the expts. are completed. On the whole, the introduction of C.1 does not result in greater complexity of segregation than when British material alone has been used.—J. S. L. Gilmour.

10143. MARSDEN-JONES, E. M., and W. B. TURRILL. Researches on Silene maritima and S. vulgaris. XXI. Bull. Miscell. Inform. Kew 1938(6): 248-254. 1938.—Two plants of S. maritima were cross-pollinated. The ovule parent (A.15) had very much anthocyanin in all parts, except the stigmata; the pollen-parent (A.12) was entirely devoid of anthocyanin in all parts. The F₁ plants uniformly showed much anthocyanin in all parts, except for segregation in the stigmata. The F₂ families showed segregation for color in all organs. From the results detailed in this paper and from results of other expts. previously published in this series it is clear that complementary and inhibiting genes are both involved in color presence or absence. In addition, it now seems probable that one set of genes is basically responsible for anthocyanin development wherever it occurs in the plant. Locally or temporally acting modifiers, however, intensifying, diluting, or inhibiting, prevent, when they are present, uniformity of action by this basic set in all parts developing successionally on a given shoot system of any one individual. Modifying effects are the product of: (1) genes of strictly circumscribed action; (2) genes whose action is less pronounced in later growth phases of a given shoot; and (3) factors environmental to gene action. Other characters whose genetic inheritance is considered are: habit, leaf-shape, calyx-shape, overlapping of petals and segments, sex, fruit-shape, and sculpturing of testa.—W. B. Turrill.

10144. METCALFE, C. R. Extra-floral nectaries on Osmanthus leaves. Bull. Miscell. Injorm. Kew 1938(6): 254-256. 2 fig. 1938.—Groups of trichomes forming nectaries secreting a sugary liquid on the under surface of leaves of O. ilicifolius are described and figured. Secretion takes place during the summer months and is favored by warm, humid conditions. During secretion wasps are attracted to the leaves in large numbers.—J. S. L. Gilmour.

10145. METCALFE, C. R. Anatomy of Fraxinus oxycarpa and F. pallisae. Bull. Miscell. Inform. Kew 1938(6): 258-262. 3 fig. 1938.—The structure of the wood and petioles of the 2 spp. is described. No reliable differences were found by which the 2 species could be distinguished by wood structure, and the only petiolar difference was the presence of unicellular hairs in pallisae and their absence in oxycarpa.

J. S. L. Gilmour.

10145. MORTON, C. V. A revision of Besleria. Contr. U. S. Nation. Herb. 26(9): 395-474. 1939.—A new classification of Besleria (Gesneriaceae) is proposed in which 4 sections and 18 subsections are recognized. 141 spp. are recognized and described, of which 43 are new. 11 new vars. and 5 new forms are descr. The genus is distributed in the West Indies and from southern Mexico to Bolivia and Brazil.—C. V. Morton.

10147. PHILIPS, E. P. Note on a species of Neorautanenia. Bull. Miscell. Inform. Kew 1937(2): 86. 1 pl. 1937.

—Describes a specimen from the western Transvaal with underground portions weighing 52 kilos.—I. S. L. Gilmour.

underground portions weighing 52 kilos.—J. S. L. Gilmour. 10148. PILGER, R. Zwei neue Gattungen der Convolvulaceae aus Angola. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 13(116): 106-107. 1936.—Two new African genera from Angola: ACMOSTEMON, related to Lepistemon, and ASTROMERREMIA, related to Merremia.—H. St. John.

10149. REIMERS, H. Was ist Tristicha phascoides Grieseb.? Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 13 (116): 35. 1936.—T. phascoides descr. by Grisebach as a Podostemonaceae is a synonym of Crassula closiana (Crassulaceae).—H. St. John.

10150. SCHMALE, F. Die Gattung Belonanthus Gräbn. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 13(116): 23-26. 1936.—Belonanthus (Valerianaceae) is restricted to the high Andes of Bolivia and Peru. A revision is given including the generic description, key to the spp., catalog of the spp., descriptions of 2 new spp. and one new comb. from Valeriana.—H. St. John.

10151. SCHULZE, GEORG MARTIN. Eine neue Loranthus-Art von Neu-Mecklenburg. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 13(116): 53. 1936.—L. jambosa, from Melanesia.—H. St. John.

10152. SEALY, J. R. Notes on Colletia species. Bull. Miscell. Inform. Kew 1937(6): 325-333. 1937.—The species dealt with are C. spinossissima Gmelin and C. aciculata Miers.—J. S. L. Gilmour.

10153. SLEUMER, HERMANN. Über die Gattung Themistoclesia Kl. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 13(116): 108-111. 1936.—Themistoclesia (Ericaceae) of the Andes of South America when revised by A. C. Smith in 1932 had 6 spp. A new revision is presented to the 12 spp. now known. It includes 1 new sp., 3 new combs. from Vaccinium or Anthopterus, and a new synonym T. dependens (Benth.) A. C. Smith (=T. pendula Klotzsch).—H. St. 10hn

10154. SLEUMER, HERMANN. Die Arten der Gattung Vaccinium L. in Zentral- und Südamerika. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 13(116): 111-140. 1936.—A synopsis and world key to the subdivisions of Vaccinium (Ericaceae); 7 subgenera and 14 sections are recognized. There follows a catalog of the species and citation of specimens. It includes 1 new name and 5 new combs.— H. St. John.

10155. SPRAGUE, T. A., and C. R. METCALFE. The taxonomic position of Rhynchocalyx. Bull. Miscell. Inform. Kew 1937(7): 392-394. 1937.—Morphological and anatomical reasons are given for placing the genus in the Lythraceae. —J. S. L. Gilmour.

10156. STEYERMARK, CORA SHOOP. Distribution and hybridization of Vernonia in Missouri. Bot. Gaz. 100(3): 548-562. 7 fig. 1939.—Five spp. of Vernonia are common to Missouri: V. crinita is confined to the lowlands of the Ozarks; V. fasciculata occurs on prairies, meadows, and alluvial soils along streams chiefly in northern and central Missouri, but is absent in the Ozarks; V. baldwini, V. missurica, and V. altissima are found in all parts of the State. Any of the 5 spp. crossed with any other Vernonia in its vicinity produce a wide variety of hybrids. Supposed hybrids grown in garden plots frequently produced Figenerations showing only characters of the typical species it most closely resembled. Seeds from plants apparently true to type, when pollination was controlled, produced some Figenerations true to type and some showing former crosses. V. altissima albiflora, when crossing was prevented in garden plots, produced the usual genetic ratio of pure V. altissima albiflora. Minor characteristics are influenced to some extent by ecol. conditions, but these characters are transmissible. Vernonias bloom the same year they germinate.—C. S. Steyermark.

FLORISTICS AND PLANT DISTRIBUTION

10157. DOMIN, KAREL. Čilimník odvislý (Laburnum anagyroides Medic.) jako nová planá dřevina česko-slovenské uvěteny. [Laburnum anagyroides, a new native forest species of Czecho-Slovakia.] [With Eng. summ.] Lesnická Práce 18(3): 157-170. 1939.—This sp. was found in 1938 in so. Slovakia, where it appears to be a Tertiary relict. The synonymy and distrib. of this sp. and of L. alpinum are discussed, and 14 vars. are listed. There are 2 hybrids, L. watereri (L. alpinum × L. anagyroides) and Laburnocytisus adamii (Čytisus purpureus × L. anagyroides).—W. N. Sparhawk.

10158. EWAN, JOSEPH. Genesis of some earth forms and its effect upon some southwestern Delphiniums. Jour. Colorado-Wyoming Acad. Sci. 2(5): 35. 1939.—The origin of section Pelligerae of Delphinium is related to the formation of basins and elevated plateaus of the southwestern U. S. where speciation proceeded without extensive racial intermingling because of isolation. The present-day distribution of species limited to major physiographic features suggests that the species arose within these localized areas.—F. Ramaley.

10159. GREBENCHIKOFF, O. On the occurrence of Fagus orientalis in Greece. Bull. Miscell. Inform. Kew 1938(1): 38-45. 1938.—The distribution of the species on Mt. Ossa, Thessaly; in Chalcidice (Kholomonda Mts.); on Mt. Athos Peninsula, and in W. Thrace is discussed.—J. S. L. Gilmour.

10160. HANES, CLARENCE R. Plants new or rare in Michigan records. Papers Michigan Acad. Sci., Arts and Lett. 24(1): 3-7. 1938(1939).—Panicum calliphyllum, Carex leavenworthü, C. richü, C. longü and Betula purpusü collected in Kalamazoo County, are new records for Michigan. Several other spp. whose range has not hitherto extended to southwestern Michigan are included.—C. R. Hanes.

10161. HERMANN, FREDERICK J. Additions to the

10161. HERMANN, FREDERICK J. Additions to the flora of Washtenaw County, Michigan III. Papers Michigan Acad. Sci., Arts and Lett. 24(1): 17-23. 1938(1939).—An annotated list of 81 spp. of vascular plants new to the county collected by the writer in 1936-1937.—F. J. Hermann.

10162. POLUNIN, N. Notes on a botanical journey in S. W. Greenland, 1937. Bull. Miscell. Inform. Kew 1938 (3): 89-98. 1938.—A preliminary report is given of the more important observations made during the summer of 1937 in the Julianehaab Distrikt of southwestern Greenland. 9 spp. were found which had not been previously reported from Greenland. The part played by the Norsemen in introducing plants is discussed and it is concluded that probably only 2 or 3 spp. were introduced by them from Scandinavia. A close study of critical forms of species possibly introduced from America may in the future give clues as to which parts of the American continent were visited by the Norsemen. Three main vegetational zones are distinguished in the Julianehaab Distrikt, a limited "Inner Fjord Zone," a broad "Middle Fjord Zone" and an "Outer Coast Zone."—J. S. L. Gilmour.

MORPHOLOGY AND ANATOMY OF VASCULAR PLANTS

(See also in this issue Entries 8876, 8896, 8910, 10123, 10230)

sempervirens with a comparison of the Sequoias. Amer. Jour. Bot. 26(4): 248-257. 23 fig. 1939.—The writer confirms the following facts: several \$\mathbb{T}\$ gametophytes may develop in each ovule; the megaspore membrane is thinner than in \$S. gigantea; no free nuclear stage exists in the embryogeny; variations in the arrangement of the proembryo cells are common; and \$S. sempervirens\$ is probably polyploid, the chromosome number in the \$\mathbb{T}\$ gametophyte being 22. The archegonia are peripheral in origin. The \$\delta\$ nucleus is maller than the \$\mathbb{T}\$ nucleus. The formation of the ventral canal nucleus is doubtful. Archegonia are most abundant in the gametophytic surfaces adjacent to the pollen tubes. They are grouped, but not enclosed, in a continuous jacket of cells. Both \$\delta\$ gametes function, so that zygotes are commonly in pairs; each zygote forms a proembryo of 4 cells, each an embryo initial; there is no prosuspensor, and the primary suspensor is followed by a massive suspensor without the intervention of successive embryonal tubes. Each embryo initial tends to produce one embryo only. One embryo per ovule matures, and development is completed in one season. Embryogeny is dissimilar in the 2 Sequoias from the first division of the zygote to the final product and the writer arranges a sequence based on embryogeny starting with Sciadopitys, and following with Sequoia gigantea, Athrotaxis, and \$S. sempervirens. A comparison of the Sequoias is made; 55 differences are found between the two, 30 of them concerning external features, and almost a \$\frac{1}{2}\$ of them differences of generic value.—P. Cook.

10164. CHRYSLER, M. A., and D. S. JOHNSON. Spore production in Regnellidium. Bull. Torrey Bot. Club 66(5): 263-279. 1 pl., 15 fig. 1939.—The sporangia of Regnellidium develop from a dolabriform apical cell instead of the more usual tetrahedral form, and give rise to 16 sporocytes.

10164. CHRYSLER, M. A., and D. S. JOHNSON. Spore production in Regnellidium. Bull. Torrey Bot. Club 66(5): 263-279. 1 pl., 15 fig. 1939.—The sporangia of Regnellidium develop from a dolabriform apical cell instead of the more usual tetrahedral form, and give rise to 16 sporocytes. Normally only 1 megaspore completes its development, but many cases are found in which 2 or more cells of a tetrad undergo some growth, and a competition may arise between 2 sporocytes. Especially in the megasporangium the tapetum attains an unusual thickness and produces a plasmodium in which a large number of nuclei cluster around the developing megaspore and appear to be active in laying down the highly specialized epispore. A comparative view of the spore-wall in the 3 genera of Marsileaceae is presented. A survey of the new evidence furnished by Regnellidium seems to strengthen the opinion that Marsileaceae and Schizeaceae are closely related.—M. A. Chrysler.

aceae and Schizeaceae are closely related.—M. A. Chrysler.

10165. COOK, PHYLLIS L. A new type of embryogeny in the Conifers. Amer. Jour. Bot. 26(3): 138-143. 13 fig. 1939.

—The early embryogeny of Juniperus communis is described, disclosing a type of embryogeny unique in the Coniferales and approximated elsewhere only in the Gnetales. The products of the fusion nucleus organize into 3 tiers of 4 nuclei each, the lower 8 of which are completely walled in. The 8 walled cells are embryo initials which elongate without dividing. After elongation, they lobe and intertwine before cutting off end-cells. The elongating-intertwining process may be repeated an indefinite number of times depending upon the keenness of competition almost ceases, the tubes farthest advanced cut off end-cells that give rise to multicellular embryos with apical cells. Only one embryo matures in each ovule, and two growing seasons are required for the full development of a normal dicotyledonous embryo. The embryogeny of Juniperus is similar to that of Ephedra and Gnetum in (a) the organization of the products of the division of the fusion nucleus, (b) the early establishment of cleavage polyembryony, and (c) the elongation and branching of the embryo initials. The similarity of embryogeny furnishes additional evidence in favor of relationship between the Coniferales and the Gnetales through the Cupressaceae.—P. L. Cook.

10166. CRAFTS, A. S. The relation between structure and function of the phloem. Amer. Jour. Bot. 26(3): 172-177. 5 fig. 1939.—The plasmodesmata of sieve plates are solid and not tubular in structure. Phloem exudation occurs

in many plants; it takes place at rates above those required to account for growth and storage; it may be maintained indefinitely. Slime plugs formed by filtering out of particulate or colloidal matter by protoplasm of the sieve plate indicate a mass flow of sap through the lumina of sieve tubes. By the difference in density between phloem exudate and water, phloem exudation has been shown in all species tested. It has been demonstrated quantitatively in many woody species, including white pine. Whereas the young sieve tube is a nucleate cell with active streaming protoplasm surrounding vacuoles of high osmotic concentration, the mature element is enucleate and fails to plasmolyse in hypertonic solutions. This indicates a high permeability at maturity. Tests on 58 species ranging from the mosses and giant kelps to most highly specialized angiosperms show the permeable condition to characterize mature sieve tubes in all plants. The common occurrence of phloem exudation and permeable sieve tubes supports the pressure flow mechanism of phloem transport.—A. S. Crafts.

mechanism of philoem transport.—A. S. Crajis.

10167. HAVIS, LEON. Anatomy of the hypocotyl and roots of Daucus carota. Jour. Agric. Res. 58(8): 557-564.

7 pl., I fig. 1939.—The transition zone of the seedling is located in the upper part of the hypocotyl and is short. The primary root, as well as the lateral roots, is diarch. Morphologically the enlarged or edible part of this plant is largely hypocotyl, although the upper toproot is often enlarged also, the proportion depending on the horticultural variety. The cortex is shed when the fleshy root and hypocotyl are 3-5 mm. in diam. The mature enlarged structure is composed largely of xylem, phloem, and pericycle parenchyma. Lateral roots originate in the pericycle and at an angle of about 45° with the primary xylem cylinder. They also often arise at the periphery of the pericycle during early secondary growth and after the cortex of the hypocotyl has disappeared.—L. Havis.

10168. KAUSIK, S. B. Pollination and its influences on the behavior of the pistillate flower in Vallisneria spiralis. Amer. Jour. Bot. 26(4): 207-211. 9 fig. 1939.—The account of pollination in V. spiralis presented differs slightly from that given by Wylie (1917). While submergence of the pistillate flowers may further pollination in the American form, it is not of such significance in the smaller Indian form but may be indirectly helpful in bringing fresh staminate flowers into the depressions about the pistillate flowers. The present account, otherwise, supports the observations of Wylie with regard to the part played by the surface film forming the depressions to capture the staminate flowers. Since the Indian form is more like the European, the present findings indicate that the account of pollination by Kerner (1891) is somewhat generalized. The differences in flower structure between the various forms from different regions call for a taxonomic review of the genus. The 2d part of the paper concerns the influences of pollination on the behavior of the pistillate flowers. The period ordinarily available for pollination is several hours, and the subsequent rate of retreat of the pistillate flower under water is slow at first, less than 1 cm. per hour. Pistillate flowers in the lake had scapes 46 cm. long; when the plants were transplanted to an aquarium with water 16 cm. in depth, the scapes attained a length of only 18 cm.—S. B. Kausik.

10169. MEEUSE, A. D. J. Development and growth of the Sclerenchyma fibres and some remarks on the development of the tracheids in some monocotyledons. Rec. trav. bot. Néerland. 35(1): 288-321. 15 fig. 1938.—Exptl. material was Sanseviera guineensis, Agave americana var. albomarginata and Musa sinensis. The average length of the sclerenchymatous elements in different leaves or leafsheaths is not constant but depends in Sanseviera and Agave upon the length of the leaf in which the elements occur, and seems to depend in Musa upon the length of the pseudostem. The sclerenchyma fibers originate by repeated divisions of parenchyma cells in the growing zone of the leaf (or sheath). They elongate to about 40 to 60 times the initial length; during this process no gliding

growth between or along other elements was observed. Secondary thickening of the cell wall occurs only when the fiber has reached its final length, and occurs in every part of the wall simultaneously and equally. When the thickening process ceases, lignification begins. In the primary cell wall the direction of the long axis of the refractive-index ellipsoid is transverse in surface view of the cell; in the secondary wall of the longest fibers the direction of this axis differs little from the longitudinal axis of the fiber; in fibers of average length the long axis of the index-ellipsoid forms an angle of about 45° with the longitudinal axis of the fiber, and in the shortest elements it shows a transverse direction. The direction and shape of the pits in the secondary wall also vary. In both primary and secondary walls, pectic substances disappear during lignification. Lignification ceases as soon as the pectic substances have disappeared or earlier, never later. No considerable increase in thickness of the wall was observed during lignification.—E. E. Cheesman.

during lignification.—E. E. Cheesman.

10170. MÜLLER, LEOPOLDINE. Der Bewegungsmechanismus der Corydalis-Blüten und sein Feinhau. (Zugleich ein Beitrag zur Frage der Verholzung in Blüten.) Oesterreich. Bot. Zeitschr. 88(1): 1-23. 4 fig. 1939.—Différences in structure and function between the flowers of Corydalis cava and C. lutea are discussed. Pollen dispersal is explosive in C. lutea, valvular ("Klappeinrichtung") in C. cava, the difference being due to the different structure of the corollar "wings". There is an elastic articulation in C. cava which is absent in C. lutea, and the stylar epidermis and subepidermal layers are lignified in C. lutea, but not in C. cava except for 4 subepidermal nests. The filaments have a "swelling tissue" in C. lutea lacking in C. cava. In both spp. the flowers have a glutinous, entomophilous pollen, which before anthesis is shed into the cavity of the wingplates so as to cover the head of stigma. The wings afford by means of a spongy parenchymatic tissue, the "latticed parenchyma" (Gitterparenchym), a construction that resists pressure and bending stress, with the minimum of weight and material waste. The stamen has a well developed nectariferous gland at its base; the spur serves as a reservoir for nectar. The mechanism of C. cava can function several times, that of C. lutea only once.—The Friesen reaction for evidence of lignin was applied for the first time to microtome sections of flowers.—M. Onno.

10171. SINNOTT, EDMUND W. A developmental analysis of the relation between cell size and fruit size in cucurbits. Amer. Jour. Bot. 26(4): 179-189. 1939.—In 12 races of cucurbits belonging to Cucurbita pepo, Lagenaria vulgaris, Cucumis anguria (West Indian gherkin), and Citrullus vulgaris, cell diam. was measured in various tissues from the central region of the ovary to the outside, at many stages from small primordia to mature fruit. In each tissue growth takes place at first chiefly by cell multiplication, though cell size slowly increases also. After a specific cell size is reached, division ceases and all further growth

is by cell expansion. The innermost tissues as compared with successively outer ones show more rapid increase in cell size during period of division, earlier cessation of division, and larger cell size when division stops. In *C. pepo*, large-fruited races as compared with small-fruited ones typically show no early difference in cell size, a more extended period of cell division, and greater cell expansion after division ceases. Differences in fruit size are due to differences in both cell number and cell size, though either may alone be responsible in certain cases. Differences in development between *Cucurbita* and the other 3 genera are described. Possible factors responsible for the differences in cell division and cell expansion between tissues and between races are discussed—*E. W. Sinnott.*

and between races are discussed.—E. W. Sinnott.

10172. STRUCKMEYER, B. ESTHER, and R. H. ROBERTS. Phloem development and flowering. Bot. Gaz.
100(3): 600-606. 18 fig. 1939.—Samples of flowering, non-flowering, and budding stems of numerous spp. were taken. Those illustrated are: Hedalgo wercklei, Fagopyrum esculentum, Vinca major, Ricinus communis, Ipomea batatas, Tagetes erecta, Delphinium ajacis, Cannabis sativa, Solanum tuberosum, and Cosmos sulphureus. There are more sieve tubes and companion cells in the non-flowering than in the flowering stems. The phloem cells were generally larger and had thinner walls in the non-flowering plants. The cambium is less active in the flowering than in the vegetative plant, and phloem parenchyma is formed as active cambial differentiation ceases. Crushing of some of the phloem cells is characteristic of many flowering plants. Callose was more abundant in the flowering than in the vegetative stem. The anatomical changes in the phloem are apparent at the same time as the appearance of blossom primordia.—B. E. Struckmeyer.

primordia.—B. E. Struckmeyer.

10173. WYLIE, ROBERT B. Relations between tissue organization and vein distribution in dicotyledon leaves. Amer. Jour. Bot. 26(4): 219-225. 10 fig. 1939.—An analysis of leaf structure for 3 groups of dicotyledons, including 22 Iowa herbaceous plants, 24 Iowa woody plants and 20 Pacific coast woody plants showed a significant relation between mesophyll organization and vein distribution, the coefficients of correlation being 0.648, 0.735 and 0.684 respectively for the 3 series. When the tissues of the blade are resolved into 2 categories (1) those of horizontal trend with cells closely united laterally (epidermis and spongy mesophyll), and (2) those of vertical elongation with limited lateral contacts (palisade), the ratio between these antagonistic systems is closely related to the distance between minor veins (the intervascular interval). Increased proportions of palisade tend to force veins nearer together, while relatively larger amts. of spongy mesophyll permit their wider separation. The working units of the foliage leaf are narrow bands of tissue associated with the minor veins. All tissue arrangements that further or retard conduction between leaf cells and veins become factors in vein distribution.—R. B. Wylie.

AGRONOMY

Editor: CARLETON R. BALL. Associate Editors: M. A. McCALL, Crops; R. B. DEEMER, Soils (See also in this issue Entries 8876, 8896, 8938, 8975, 8981, 8982, 8992, 9012, 9019, 9024, 9034, 9801, 9810, 10071, 10120, 10216, 10250, 10298, 10306, 10312, 10313, 10326, 10336, 10338, 10348, 10366, 10370, 10417)

CROP SCIENCE (ARVICULTURE)

10174. ALBERT, A. R., R. H. LARSON, and J. C. WALKER. The comparative productiveness of seed potatoes grown on sandy and on peat soils in Central Wisconsin. Amer. Potato Jour. 16(1): 16-24. 1939.—In 1934, parallel trials on Plainfield sandy loam at Hancock, Wis., and on peat at Coddington, Wis., with Katahdin potato var. from identical seed-tuber stock grown on sandy loam and peat, respectively, showed higher yield at each location in the crop from peat-grown tubers. In 1935 like trials with 3 vars. on sandy loam, peat, and black silt loam, respectively, gave similar results. In 1936 seed stock of 4 vars. which had been produced on sandy loam in one locality, peat in 2 localities, and silt loam in 2 localities was planted at each of 5 locations. Again the trend was in favor of Coddington-peat seed, though differences in its favor were not so great

when single vars. were considered. In 1937 replicate trials of 3 vars., 2 of which had been increased in 5 locations, one in 3 locations, were made, plots being arranged at random and replicated 3 times at each location. Significant increases in the yield from Coddington-peat seed over sandgrown seed prevailed in most instances.—J. C. Walker.

10175. ALBRECHT, WM. A., and A. W. KLEMME. Limestone mobilizes phosphates into Korean lespedeza. Jour. Amer. Soc. Agron. 31(4): 284-286. 1939.—Measurements of the yields and composition of lespedeza given phosphates and the combined treatments of limestone and phosphate showed not only much increased tonnage yields, but also higher conc. of protein in the crop when the 2 treatments were used together than when phosphate was used alone. Through the yield increase, there was 3 times as much P taken from the soil when phosphate additions

were accompanied by limestone as when phosphate was used alone.—Authors.

10176. BAKKE, A. L., W. G. GAESSLER, and W. E. LOOMIS. Relation of root reserves to control of European bindweed, Convolvulus arvensis L. Iowa Agric. Exp. Sta. Res. Bull. 254. 113-144. 1939.—The reserves of bindweed roots consisted mainly of sucrose and dextrin. Reducing sugars and starch were less important; lead-precipitable gums were of doubtful value as reserves, and hemicelluloses were not used. Bindweed roots grew to a depth of 22 ft. in the loess soils of Northwestern Iowa, and had a total dry weight of as much as 1800 lbs. an acre, containing 587 lbs. of carbohydrates. Under fallow treatment the reserves disappeared from the roots of the surface foot in 2 weeks and from the 2d foot in 3 mos., but the roots 8 ft. deep were still well filled with reserves after 15 mos. of intensive cultivation. The persistence of the plant under fallowing was due to the small quantity of reserves necessary to re-generate new growth and to the slow rate of removal from the lower roots, rather than to the presence of unusually large quantities of reserves. Roots treated with 800 lbs. of NaClO, an acre in 2 applications were depleted of reserves at a rate which suggested direct destruction of the carbohydrates within the cells of the treated roots. Neither 2 years of fallowing or 800 lbs, of NaClO₂ completely eradicated the weed. Smother crops had little effect upon the reserves of bindweed roots. Plants growing in corn were highest in reserves, plants under soybeans and sudan grass intermediate and those under cane lowest, but plants spaded once in midseason and growing rapidly without competition were equally low.—A. L. Bakke.

10177. BAKKE, A. L. The soil moisture relationship of European bindweed growing in corn. Jour. Amer. Soc. Agron. 31(4): 352-357. 1939.—Soil samples taken at depths of 1 and 2 feet from corn ground heavily infested with European bindweed (Convolvulus arvensis) and from ground free of the weed during the summer months of 1933, 1934 and 1935 did not show marked differences in their soil moisture content. Due to a deeply penetrating root system the European bindweed can maintain itself when the moisture content of the upper 2 feet is below the wilting coefficient. Corn was not able to compete successfully with the bindweed when the soil moisture content

was near the wilting coefficient .- A. L. Bakke.

10178. BARR, C. GUINN. Organic reserves in field bindweed as affected by cultivation. Jour. Colorado-Wyoming Acad. Sci. 2(5): 31. 1939.—Total carbohydrates of roots of undisturbed plants was 17% in late summer, cultivation at 2-week intervals reduced this by 7-12%. One cultivation early in the season reduced total carbohydrates 46% but a late cultivation reduced the carbohydrates only 24%.

F. Ramaley.

10179. BEATH, O. A., C. S. GILBERT, and H. F. EPPSON. The use of indicator plants in locating seleniferous areas in the western United States. I. Amer. Jour. Bot. 26(4): 257-269. 12 fig. 1939.—Sel areas in Idaho, California, Nevada, Arizona and Utah were located by the presence of Se indicator plants (spp. of Stanleya, Astragalus, Xylorrhiza and Oonopsis). All of the spp. of Stanleya, Oonopsis and Xylorrhiza thus far investigated were seleniferous, while the consistently seleniferous spp. of Astragalus thus far found belong to but 5 of the 29 groups into which Jones has divided the genus, namely the Bisulcati, Galegiformes, Ocreati, Podo-sclerocarpi and Preussii. Intermediate Se bearing plants include certain spp. of Aster, Machaeranthera, Sideranthus, Atriplex, Mentzelia and Pentstemon. Studies were made of the variation in Se content of several formations, namely, a shale outcrop in Provo Canyon, Utah; the Ferris formation in Hanna Basin, Wyoming; and a Niobrara shale outcrop in Albany

County, Wyoming.—O. A. Beath.
10180. BROWN, B. A. Some factors affecting the prevalence of white clover in grassland. Jour. Amer. Soc. Agron. 31(4): 322-332. 1939.—From observations of many grazed and lawnmown plats, important factors affecting the prevalence of white clover (*Trifolium repens*) in grassland have been found to be: (1) Source of seed—indigenous strains have lived longer. (2) Fertilization—P and lime were essential on run-out pastures and K2O also on runout

meadows; in either case, nitrogenous fertilizers decreased the clover. (3) Kinds of grasses—the turf forming spp., eg., bluegrass and bent grasses, reduced the amt. of clover.

(4) Management—cutting to ½-inch resulted in much less of the large and some less of the small types of white clover in Kentucky bluegrass swards; volunteer white clover was not retarded by increasing the height when cut

clover was not retarded by increasing the height when cut from 2 to 3, 4 or 5 inches.—B. A. Brown.

10181. CARDON, P. V. Toward a grassland agriculture. Jour. Amer. Soc. Agron. 31(3): 229-231. 1939.—Grass as a farm crop is worthy of as good land and as intelligent culture as any other crop. It is the basis of a type of farming in Thick the control of the control o ing in which the control of erosion, the protection of water-sheds, and the improvement of pastures and ranges follow as matters of course. Once given its proper place in American agriculture, grass will be found economically feasible as a dependable source of feed for livestock, as a soil-improving crop to be reflected in the returns from other crops, and as an otherwise legitimate component of cropping enterprises. Grassland agriculture represents an advance toward stabilized agriculture, and it should be adopted as a worthy goal seeking the alignment of forces of all research, educational, and action agencies to insure its achievement.—P. V. Cardon.

10182. CARRERRAS G., JOSÉ. El limite extremo final en la produción de las plantas cultivadas. Agronomia [La Molina 3(15): 3-15. 1938.—The percentage N content of any plant sp. or var. is a constant, little influenced by N fertilization, and is a prime factor in vegetative production. Under comparable conditions, spp. or vars. containing lesser proportions of N in their tissues produce the greatest yields and respond best to added N. Available soil N determines the increment of vegetative material produced. The law of N efficiency (the yield of a plant is inversely proportional to its percentage N content) was confirmed by expts. on 6 vars. of sugar cane. These facts should be of great importance to geneticists and agronomists in developing new vars. and determining economic usage of N fertilizer. J. Matz.

10183. COUCH, JAMES F., REINHOLD R. BRIESE, and J. H. MARTIN. Hydrocyanic acid content of sorghum varieties. Jour. Washington Acad. Sci. 29: 146-161. 1939. Plant and leaf samples of 33 sorghum vars. grown at one or more of 6 stations in the Great Plains area in 1936 and 1937 were analyzed for HCN content at various stages of growth. It appears that any var. tested may at times contain sufficient HCN to be toxic to livestock. Feterita, hegari, Chiltex, and Sumac sorgo tended to be high in HCN; milo, darso, Atlas sorgo, and Kansas Orange sorgo were intermediate; and Leoti sorgo and "African Millet" sorgo and a selected strain of Dakota Amber sorgo were rather low in HCN. Vars. of kafir showed wide variation some being high and others low in HCN. The comparative rank among the stations in average HCN content of the samples was different in the 2 seasons. The HCN content of the comparative rank among the stations in average HCN content of the samples was different in the 2 seasons. of the sorghums showed some tendency to be high where summer precipitation was lowest but there was no consistent relation between HCN content of sorghum and differences in temp. Young feterita plants grown under abundant moisture conditions at Arlington, Virginia, contained as much HCN as the average for the 6 Great Plains stations where drought was severe. The HCN content of dry leaves of sorghum vars. ranges from about 12 to 75% of that of the whole green plant.—Auth. summ.
10184. CROSS, WM. E. Observaciones effectuadas en la

Provincia referentes a los effectos de las heladas sobre la cana. [Observations made in the Province relating to the effects of frosts on cane (sugar).] Rev. Indust. y Agric. Tucumán 28(7/9): 159-161. 1938.—Frost arrests the increase of sugar in the juice and of purity, and decline in these factors takes place after a lapse of 6 weeks or longer according to the intensity of the frosts. Dates, degrees of frost and percentages of sugar content, purity and decline are given. Cane left standing in the field will recuperate after the decline when growing weather again prevails. Seed-cane that has been affected by frosts as low as -4.8°C is still suitable for planting, especially if the lower halves of the canes are used.—J. W. Gilmore.

10185. CUMINGS, G. A., and G. V. C. HOUGHLAND.

Fertilizer placement for potatoes. U.S. Dept. Agric. Tech. Bull. 669. 1-48. 16 fig. 1939.—Field tests of fertilizer placement for potatoes were made in northern Maine, central New Jersey, on Long Island, New York, on the Eastern Shore of Virginia, in northeastern Ohio and in 2 localities in western Michigan. A combined planter and fertilizer distributor of special general design was constructed and used in most of the expts. Fertilizers of both single- and double-strength grades were applied at the usual rates per acre and at other rates in each of the districts. Placement of the fertilizer in a band at each side of the row generally produced the most rapid emergence of sprouts, the most vigorous plant growth and the highest yields of primes as well as total yields. The preferable placement was in a band 2 inches to each side and on the lower level of the seed piece. Placement of the fertilizer immediately under, above, or around the seed piece usually resulted in delayed sprout emergence and a reduced yield. Placement in a band at only one side of the row gave lower yields than at each side. Hill placement of fertilizer in short bands at each hill showed no advantage over comparable placements in continuous bands for seed spacings of 12-16 inches.—Authors.

10186. FISHER, J. Farming in Natal—past and future. S. African Jour. Sci. 35: 52-68. 1939.—The address deals with the area and climate which includes rainfall and temps. and shows how these are affected by relative altitude. Brief reference is made to the geology of Natal Soils and their poorness in phosphates is mentioned. Grass, natural in the veld, is indicated as the most valuable crop, though this has undergone serious retrogression. Crop removal is contrasted with the removal of animal products, and crops are mentioned as suitable for the average dairy farm. Stress is laid upon the necessity for "strain-work" in pasture grasses and crops. With regard to livestock, emphasis is laid on the need for improved germ plasm, and a better understanding of the laws of inheritance as governing certain characters. The whole question of maintenance of soil fertility through increased livestock husbandry, is reviewed. Farming systems are discussed in the light of local and overseas markets and intensities of production are described. The important rôle played by education in bringing the farming up to the requisite standard is mentioned, and a plea is made for the further development of agricultural education in Natal up to university status.—

J. Fisher.

10187. GAGE, CHARLES E. The tobacco industry in Puerto Rico. U. S. Dept. Agric. Circ. 519. 1-53. 18 fig. 1939. —Tobacco, almost exclusively of cigar-filler type, ranks second among cash crops for which continental U. S. provides the most important outlet. Shade-grown cigar-wrapper tobacco was abandoned in 1927 but expts. by the Tobacco Institute look to a possible renewal. Methods of marketing tobacco, mostly in U. S., are closely related to available sources of production credit.—C. E. Gage.

10188. GODFREY, G. H. The control of nut grass with chloropicrin. Soil Sci. 47(5): 391-394. 1 pl. 1939.—Exptl. work is presented to demonstrate that chloropicrin fumigation is an effective means of eradicating nut grass (Cyperus rotundus) from the soil. The chloropicrin is applied in the dry soil in holes at 12- to 15-inch intervals, at the rate of about 2½ cc. per sq. foot (400 pounds per acre). The gas is confined for 3 or 4 days by covering the soil immediately after treatment with a sheet of gas-impervious paper buried at the edges about 5 inches, or by keeping the upper surface of the soil wet to a depth of 2 in. In loose dry soil the "nuts" are killed to a depth of 20 in. The treatment costs about \$1.00 for 100 sq. feet.—G. H. Godfrey.

10189. HALL, THOS. D., and B. ALLEN. Intensive grazing on Kenya veld. E. African Agric. Jour. 4(3): 1-18. 7 fig. 1938.—A grazing expt. run for 5 yrs. at an altitude of 8,500 ft., with a rainfall of 48 to 50 inches falling in 2 seasons is described. The dominant grass species was Pennisetum schimperi with Andropogon chrysostachyus and Trifolium johnstonii in small amts. Frost is recorded in 6 months with a minimum of 12 to 16° F. 8 paddocks each 2½ acres in extent and fertilized in different ways were grazed rotationally by Ayrshire cows to obtain records of grazing days and milk yields. The coarse "wire" grass P. schimperi became less harsh on all the paddocks and

the *T. johnstonii* increased considerably on all the fertilized paddocks, excepting the one getting no phosphates. The fertilized paddocks withstood drought better than the outside veld, and also recovered from it more quickly. There was no significant benefit from the use of lime or potash and little from phosphates alone, but the benefits from N were most evident, and phosphates and N fertilizers together gave an increased milk yield of 62%. The use of these fertilizers at a rate of 350 to 500 lbs. per acre was economically justified by the milk returns alone. The carrying capacity of the veld was increased from 3 acres per cow to 1 acre per cow in 5 yrs. During the last 3 yrs. grazing was available on 291 to 351 days per annum. There was also a saving on concentrates, as the paddocks were able to provide maintenance and enough for the production of 2 to 2½ gallons of milk, except during dry periods. Other benefits to the cows on the expt. and their progeny were good health, regular calving and early maturity. The heifers on the plots calved down at just over 2 yrs. Good pasture management by rotational grazing, the regular use of the mower, harrow and fertilizers on this veld type have produced profitable results.—*T. D. Hall*.

10190. HARRINGTON, J. B. The number of replicated small plat tests required in regional variety trials. Jour. Amer. Soc. Agrom. 31(4): 287-299. 1939.—During a 3-yr. period 1010 tests each containing between 18 and 25 4-row plats of wheat or barley vars. replicated 3 to 5 times were distributed on farms over an area of 100,000 sq. miles in Saskatchewan, Canada. Variance analyses on yield of grain showed that this large number of tests was needed to reveal the comparative behavior of the vars. under the particular conditions existing in many different localities, and that a marked reduction in the number of tests would have obscured some differences and caused much of the information from the remaining tests to be of doubtful significance.—J. B. Harrington.

10191. HERMANN, WILFORD, and ROBERT ESLICK. Susceptibility of seedling grasses to damage by grasshoppers. Jour. Amer. Soc. Agron. 31(4): 333-337. 1939.—Four spp. of grasshoppers—Camnula pellucida, Melanoplus mexicanus, M. femur-rubrum, and M. bivittatus, differentially attacked 405 selections of 28 spp. of grass. The spp. of grasses most susceptible to damage by grasshoppers were Bromus mollis, Deschampsia elongata, Festuca idahoensis, F. ovina, and F. rubra var. commutata; the least susceptible spp. were Agropyron smithii, Bromus inermis, Elymus canadensis, and Phalaris arundinacea. Cultivated spp. of grasses intermediate in susceptibility to damage by the insects were Agropyron cristatum, A. pauciflorum, Arrhenatherum elatius, and Dactylis glomerata, and Festuca elatior. Selections within spp. often varied as widely in susceptibility to damage by grasshoppers as the variation between the spp.—W. Hermann.

10192. JACOB, K. C. Grass flora of the Kollegal Forest Division with short notes and vernacular names wherever available. Indian Forester 64(7): 419-429. 1938.—The grasses in this Division of the Coimbatore District are important, since ½ of the forest revenue is derived from grazing permits. Of 390 spp. of Madras grasses 65 were collected from an area of about 1,000 sq. miles. Of these, 40 are good fodder grasses. Short notes on the forage value of all of them are given, with suggestions for the improvement of these grazing areas.—Auth. abst.

10193. KEARNS, VIVIAN, and E. H. TOOLE. Relation of temperature and moisture content to longevity of Chewing's fescue seed. U. S. Dept. Agric. Tech. Bull. 670. 1-26. 1 pl. 1939.—Seed of Chewing's fescue (Festuca rubra var. commutata) shipped from New Zealand under different conditions and seed raised in Virginia and in Oregon were stored at various temps. and with various moisture contents to determine factors affecting longevity of the seed. When stored in sealed containers, seed at 30°C lost about 20% in germination in 4 to 5 weeks when the moisture content was approx. 14%, in 4 to 5 months with 12% moisture, in 12 mos. with 10% moisture, but with 8% moisture there was no loss in 15 months; seed at 20°C lost about 20% in 8 to 10 mos. with 14% moisture, less than 10% in 15 mos. with 12% moisture, but with 10 and 8% moisture there was no loss in 15-24 mos.; seed at 10°C lost about 20% in 24 mos.

with 14% moisture, but there was no loss in this time with 10% moisture; seed at 2° and -10°C had not lost any in germination in 15-24 mos. with any of the above moisture contents. When seed with high moisture content was held in cool storage for 1 to 6 months, either under controlled conditions or during oversea shipment, and then was transferred to high temps. (20-30°C), loss of viability was rapid. The rapid decline in germination of seed having a high moisture content was checked by drying the seed. Seed of commercial strains of F. rubra responded to storage conditions in about the same way—Authors.

10194. KELLEY, W. P. Effect of dilution on the water-soluble and exchangeable bases of alkali soils and its bearing on the salt tolerance of plants. Soil Sci. 47(5): 367-375. 1939.—Increasing the water content of 2 types of alkali soil above the optimum for good tilth tended to increase the amt. of Na, HCO₃, and SO₄ in soln. in the soil moisture, but produced but little effect on Cl, NO₃, Ca and Mg. However, the magnitude of this effect was not sufficient to cause serious error in the determinations of the exchangeable bases. The effect of variability in the distribution and the kinds of soluble salts present and the moisture content of the soil, the influence of absorbed ions on plants and the rôle played by the salts of low solubility are all reflected in the growth of plants. These variations are so wide as to suggest that salt tolerance of plants can be better investigated by the use of soln. cultures.—W. P. Kelley.

10195. McCALL, RALPH. Seasonal variation in the composition of bluebunch fescue. Jour. Agric. Res. 58(8): 603-616. 1939.—Samples of bluebunch fescue (Festuca idahoensis) were gathered at semimonthly intervals from the fall of 1930 to the fall of 1934, and the analyses are reported. Stage of maturity was a considerably more important factor in seasonal change in chem. composition of this grass than weather. The greatest seasonal variation was in crude protein which had a maximum range from 25.55% to 2.85% on the water-free basis. This indicates a variation from a on the waterine sais. In includes a variation in the protein-rich concentrate to a rather poor roughage. The trend in per cent of P was very similar to that of crude protein though not quite so decided. The decline in per cent of Ca was smaller and less prolonged than that of P. However, the per cent of ash increased from the new growth, through maturity, and more gradually to the end of the year. This variation was probably due to silica in the ash. The trend in crude fiber was opposite to that of crude protein though not to the same degree, and most of the variation occurred by the time the grass was matured. N-free extract was highest during the maturing period in the summer and early fall. The % of crude fat was highest in the new-growth with a rather irregular trend downward into the winter. Hot dry weather during the growing and maturing season seemed to be associated with a higher % of crude fiber and a lower % of crude protein.—R. McCall.

10196. MOSER, FRANK. The adaptability of rapid chemical tests for use in determining the nutrient needs of South Carolina soils. Jour. Amer. Soc. Agron. 31(3): 188-199. 1939.—Comparisons of the Universal, Purdue, Simplex, Bray, and LaMotte rapid tests were made on 4 soil types on which fertilizer expts. had been conducted to determine their adaptability for use in testing S. Carolina soils. Calibrations of these rapid tests were also made for available P and K with yield responses from fertilizer and with chemical methods of availability such as Truog method for available P and the replaceable K. These data show that the Universal, Simplex, and LaMotte rapid testing methods are indicative of the P needs of soil, while the Purdue and Bray tests due to their relatively strong acid extracting soln. tend to give higher amount of available P than the other methods and are not as reliable. The 5 methods used for testing available K show similar results on the 4 soil types. All of the methods show about the same amount of available K for soil having approx. the same M. E. of K.—These studies indicate that the Universal, Simplex, and LaMotte rapid testing methods for P and any one of the K tests may be beneficial in supplementary existing information for making fertilizer recommendations for S. Carolina soils.—F.

10197. OLSON, O. E., and A. L. MOXON. The availability, to crop plants, of different forms of selenium in the soil.

Soil Sci. 47(4): 305-311. 1939.—The chemical forms of Se occurring naturally in soils, and the relationship of geol formations to the Se content of soils are discussed briefly. The cycle of Se in nature is illustrated and explained. 6 soils from seleniferous areas were analyzed for total N, Ca, Fe, S, and Se, base exchange capacity, texture, water-soluble Se and S, and acid-soluble, ammonia-soluble and insoluble Se. Several common crop plants were grown in each of these 6 soils, in the greenhouse, and the plants were analyzed for Se. Water-soluble Se and ammonia-soluble Se in the soils were found to be fairly accurate indicators of Se availability to plants. No relationship between the Se content of plants and the total or water-soluble S content of soils in which they grew could be demonstrated.—O. E. Olson.

10198. RUCHKIN, V. N. Vysykhafushchafa sposobnost' l'nfanogo masla v protsesse sozrevanifa semfan. [The drying capacity of linseed oil in the course of ripening of seeds.] [In Russ. with Ger. summ.] Biokhimia 3(5): 628-632. 1938.—Analyses of linseed oil at various stages of ripening of the seeds showed that the drying time is shortest in early stages of ripening, longest in oil from fully ripened seeds. Both the iodine number and oxygen absorption increase with ripening. The shorter drying time in early stages is due to a shorter induction period for auto-oxidation. The authors believe that the time of gathering of seeds should not affect the quality of oil used for technical purposes.—E. K. Johnson.

10199. SLOAN, SAM L., ARDEN W. JACKLIN, and VERLE G. KAISER. Soil-conserving and soil-improving crop rotations for the Palouse. Jour. Amer. Soc. Agron. 31(4): 300-313. 1939.—The Palouse area of eastern Washington and adjacent Idaho was plowed out of prairie only a little more than 50 yrs. ago. The cropping systems have been largely soil depleting, conducive to erosion and accelerated run-off. A typical farm unit has been about 500 acres divided into 2 major fields, ½ fallow or seed peas and ½ winter wheat. Crop land constitutes 75% of the total acreage of the area and under past methods about 1 of the acreage has become sub-marginal for cash crop production. The Soil Conservation Service has introduced 2 major changes in farming methods: the introduction of soilbuilding and soil-conserving crops in systematic rotations with a corresponding decrease in summer fallow; and use of distinct types of treatment of different soil types based on slope and degree of erosion. Soil-improving rotations are used on crop lands having gently sloping and only moderately eroded soils. This type of rotation varies from 4 to 6 yrs. and includes 2 yrs. of a biennial legume (sweet clover) and grass in practically all instances. Provision is made for a semi-erosion-controlling cover on the land during the entire period in the case of the 4-yr. rotation and 4 yrs. out of every 6, in the 6-yr. rotations. Soil-conserving rotations are used on the most severely eroded crop lands and on the steeper slopes. This type of rotation varies from 6 to 9 yrs. in length and generally includes a perennial legume (alfalfa) and grass for 3-5 yrs., or a biennial legume followed by grass for seed production for an equal period. Provision is made for a complete erosion-controlling cover on the land 3 years and semi-erosion-controlling the other 3 yrs. in a typical 6 yr. rotation, and a corresponding degree of control in the 7- and 9-yr. rotations.—S. L. Sloan.

10200. THORNTON, BRUCE J. Recent developments in the use of sodium chlorate in bindweed control. Jour. Colorado-Wyoming Acad. Sci. 2(5): 33. 1939.—NaClO₂ is pound for pound twice as effective in bindweed control as Ca(ClO₂)₂. One treatment per yr. for 2 yrs. with 3 lbs. of NaClO₂ per sq. rod gave optimum results in expts. in 3 sections of Colorado.—F. Ramaley.

10201. THROCKMORTON, R. I. Laboratory teaching in beginning courses in crops and soils. Jour. Amer. Soc. Agron. 31(3): 232-238. 1939.—Research has developed faster than teaching methods because of greater opportunities for advancement in the field of research. Technic development should be further reduced in teaching beginning courses in crops and soils and greater use should be made of the demonstration method. Detailed reports and drawings are being replaced by the short quiz.—R. I. Throckmorton.

10202. WEINMANN, H. Effect of fertiliser treatment on Transvaal Highveld. S. African Jour. Sci. 35: 246-249. 1939.—

Data are presented on the effect of various combinations of fertilizer treatments on the yield and chem, composition of the herbage of Transvaal Highveld and on the chem. composition of some important individual grasses of this type of veld. PNK treatment greatly increased the yield of herbage and increased the N and P content of total herbage as well as of individual spp. Different spp. respond in different ways to the fertilizer treatments applied. N in the form of (NH₄)₂SO₄ had the same effect as N in the form of NaNO₂.—H. Weinmann.

10203. WIGGANS, R. G. The influence of space and arrangement on the production of soybean plants. Jour. Amer. Soc. Agron. 31(4): 314-321. 1939.—By the use of 7 spacings (1-inch to 6 inches) in the rows and 5 different spacings between rows (8-32 inches) the effect on the yield of an early maturing comparatively small growing soybean (Cayuga) was studied. The series of spacings required from 1 to 18 pecks of seed per acre, while the space per plant varied from 8 to 144 sq. inches. Each arrangement was repeated 8 times in 4-row blocks of 25 ft. length. Only the 2 central rows of the blocks were used for yield determina-tions. The yield decreased with any and all increases in the distance between rows, but a wide range in the distance between plants in the rows had little effect. Generally the nearer the arrangements of plants for any given rate approached a uniform distribution on the area occupied, the greater the yield.—R. G. Wiggans.

SOIL SCIENCE (EDAPHOLOGY)

10204. CHEPIL, W. S., and R. A. MILNE. Comparative study of soil drifting in the field and in a wind tunnel. Sci. Agric. [Ottawa] 19(5): 249-257. 1939.—The nature and magnitude of wind erosion in the tunnel of a suitable size and in the open field were found to be similar for similar force of the wind. The vertical velocity gradient of the wind depended entirely on the type of surface, irrespective as to whether it was in the wind tunnel or in the open field. Since soil drifting was found to depend largely on the force of the wind and on the velocity gradient up to the height of about 18 inches or more, it was concluded that a wind tunnel of a suitable design can be accepted as a means of

practically duplicating field conditions.—W. S. Chepil.

10205. GERDEL, R. W. Preservation of small core soil samples. Soil Sci. 47(5): 353-356. 1 pl. 1939.

10206. LONGNECKER, T. C. The use of a Taylor phosphate slide comparator for the determination of phosphates in soil extracts. Jour. Amer. Soc. Agron. 31(4): 362-364. 1 fig. 1939.

10207. PURI, AMAR NATH, and R. C. HOON. Physical characteristics of soils: III. Heat of wetting. Soil Sci.

47(5): 415-423. 1939.

10208. RAVIKOVITCH, S. Influence of exchangeable cations on the availability of phosphate in soils. Soil Sci.

47(5): 357-366. 1939.—The degree of availability of the adsorbed PO₄ by Ca-soils, H-soils, and soils in which the H was replaced by Ca, after being saturated with PO4, was detd. The influence of the exchangeable Ca, Mg, NH, K, Na, and H on the degree of adsorption and liberation of PO₄ was studied, as was the rôle of the exchangeable H in the decomposition of Ca₃(PO₄)₂. The greatest availability was established for the PO₄ adsorbed by the Ca-soil. The combination of the soil complex with the PO₄ and exchangeable calcium was proved to be very unstable, breaking down under the action of very weak acids. The availability of the PO, adsorbed by the H-complex is low, and its liberation is associated with the partial destruction of the complex. Introduction of Ca into the H-complex containing PO₄ in an adsorbed state increases the stability of the complex and decreases the degree of PO₄ liberation. The effectiveness of the various exchangeable cations in liberation of the adsorbed PO is in the order Na > K > NH₄ > H > Mg > Ca. These cations, according to their effectiveness in PO₄ adsorption, are arranged in a reverse order. The contact of mineral and organic H-complexes with Clas(PO₄)₂ leads to the solution of the salt. Whereas the dissolved phosphate is in part adsorbed by the mineral complex, it is not retained in any appreciable quantity by the organic complex.-Auth. summ.

10209. ROLLER, EMERY M., and NELSON McKAIG, Jr. Some critical studies of the phenoldisulfonic acid method for the determination of nitrates. Soil Sci. 47(5): 397-407.

10210. TEMPLIN, E. H., and R. M. MARSHALL. Soil

survey of Hunt County, Texas. U. S. Dept. Agric. Bur. Pl. Indust. 1934(14): 1-56. Map, 2 fig. 1939.
10211. THORP, JAMES, T. W. GLASSEY, T. J. DUNNE-WALD, and B. L. PARSONS. Soil survey of Sheridan County, Wyoming. U. S. Dept. Agric. Bur. Pl. Indust. 1932

(33): 1-48. 2 maps, 2 pl., 1 fig. 1939.

10212. VOLK, N. J. The determination of redox potentials of soils. Jour. Amer. Soc. Agron. 31(4): 344-351. 1939.—Through the use of nitrogen gas to prevent oxidation of reduced compounds in the soil, and through the use of refrigeration to prevent bacterial reduction, samples of soils were stored several days prior to analyses for redox potential without materially affecting the initial Eh. technique proved extremely valuable when samples had to be stored prior to analyses. The Eh/pH relationship in soils varied from 58 to 101 for the soils studied, thus it is inadvisable to use the common factor of 59. Straight, smooth, wire blank electrodes are superior to Pt foil since roots clinging to the foil cause misleading results to be obtained. The method described has a limit of error of ± 5 mv.—N. J. Volk.

10213. WADSWORTH, H. A. Some factors influencing the heat of wetting of soils. Soil Sci. 47(5): 385-390. 1939.

HORTICULTURE

F. C. BRADFORD, Editor

(See also in this issue Entries 8876, 8896, 8910, 8927, 8934, 8939, 8941, 8944, 8975, 8985, 9023, 10042, 10063, 10167, 10300, 10315, 10323, 10325, 10330, 10346, 10375, 10376, 10377, 10475)

10214. ARNOLD-FORSTER, W. More shrubs for a mild wind-swept garden. New Flora and Silva 11(3): 196-201. 1939.—On a site 600 ft. on a Cornish moor, sloping north and overlooking the Atlantic half a mile away, the following plants were tried with success: Senecio rotundifolius grew unstaked, untended, unscorched in face of a 100 mile an hr. gale off the sea. Pittosporum crassifolium, P. ralphii, P. kirkii, P. fairchildii, likewise withstood an extraordinary amt. of wind. Pernettya mucronata carried a load of berries every winter and never scorched. Other very wind-hardy shrubs were Coprosma baueri, Corynocarpus laevigatus, Tetranthera japonica, Escallonia exoniensis, Quercus ilex. and Griselinia littoralis. Many less hardy plants were also

mentioned.—D. Wyman.

10215. BARKER, J. The storage of hot-house grapes.
[Gr. Brit.] Dept. Sci. and Indust. Res. Ann. Rept. Food Invest. Bd. 1937: 166-167. 1938.—Colmar grapes stored at the sci. and the best process of the sci. and the sci 34°F with water feeding from bottles on racks show less

loss of weight, better appearance and less rotting than those stored at 34° without water feeding. A modification in technique in which the water is supplied from a small rubber bulb fitted to the stalk is suggested.—J. Barker.

10216. BARNETTE, R. M., H. W. JONES, and J. B. HESTER. Lysimeter studies with the decomposition of summer cover crops. Florida Agric. Exp. Sta. Bull. 327. 1-44.

3 fig. 1938.—The effects of Crotalaria striata, velvet beans, and Natal grass as cover crops upon the soil used and upon and Natal grass as cover crops upon the soil used and upon lemon seedlings grown in the lysimeter tanks were studied in 2 sets of expts., which are separately reported. The lemon seedlings averaged, in one of the expts., 2.73 times the dry weight of those without cover crop when grown with the Crotalaria, and 2.88 times when the velvet bean cover crop was used. Detailed results of the effects of the cover crops, variously handled, upon the plant food content of the soil and its leaching are given.—Courtesy Exp. Sta. Rec. 10217. BLAAUW, A. H., IDA LUYTEN, en ANNIE M. HARTSEMA. Snelle bloei van Hollandsche Irissen. II. [Early flowering of Dutch irises. II.] K. Akad. Wetenschap. Amsterdam Proc. Sect. Sci. 42(1): 13-22. 1939.—The best treatment to bring about early flowering of Irises is keeping the bulbs for 5 weeks at 23° C after harvesting in the early fall. During this period neither growth nor flower formation takes place, but there is a marked effect on the future flower formation. A treatment of 1 week at 31° C instead of the above mentioned treatment was in general not satisfactory. About Sept. the first treatment was followed by one of a longer duration at 7°, during which period flower formation takes place. At 9° flower formation in this period is slower than at 7°. Mostly about the middle of Dec. the plants were transferred to 15° where the final flowering took place. The first flowers appeared early in Mar. and almost all the treated bulbs produced flowers.—J. van Overbeek.

10218. BOLIN, DONALD W., and WILBUR SCHROEDER. The calcium-phosphorus ratio of the skins of canning peas and its relation to maturity. Jour. Agric. Res. 58(8): 631-636. 1939.—Skins from green canning peas (Pisum sativum) analyzed at different stages of maturity show an increase in Ca and a decrease in P. The ratio of these 2 elements should provide a good method of determining maturity and quality of raw peas for canning.-Authors.

10219. DEUBER, CARL G. Soil fertility and root development. Eastern Shade Tree Conference, Proceedings Dec. 8, 9, 1938. p. 75-78. 1939.—In the New England hurricane, straining and wrenching resulting in root breakage and stripping of root bark. Fertilization stimulates formation of small, much branched feeding roots. Deeper rooting and lateral development are encouraged by placing fertilizers beyond the most concentrated area of roots, which usually occurs within several feet of the trunk. In New England, the most common method of placing fertilizers for shade trees is in holes 18 ins. to 2 ft. deep made in circles about 30 inches apart beginning near the trunk and extending beyond the spread of the branches. The crowbar method permits use of organic materials which extend the period over which the nutrients become soluble. For placing quickly available nutrient in lower soil levels, injections of dilute solns, of fertilizers into the soil under pressure are recommended. The amount and kind of fertilizers vary with climate and soil composition; in New England 1 lb. of 10-8-6 per inch of trunk circumference seems adequate. R. Silverman.

10220. GARDNER, V. R., F. C. BRADFORD, and H. D. HOOKER, Jr. The fundamentals of fruit production. 2nd ed. xvi+788p. 79 fig. McGraw-Hill Book Co.: New York, 1939. Pr. \$5.—This textbook attempts to focus attention on the tree's growth and its steadily increasing requirements and on the conditions making it profitable as a producer of fruit, practices being considered only as they affect these conditions. Particular attention is given to the inclusion of sufficient illustrative matter to permit quantitative estimate of the validity and applicability of the principles enunciated. As in the 1st edition, exhaustive treatment of the subject is not attempted, but effort has been made to include the results of the more significant researches and experiences as they lead to a better understanding of the tree's adjust-ment and reaction to its environment. The text is not intended as a manual on how to grow fruit, but is designed to prepare the college student to undertake the obtaining of all data pertinent to a problem, systematizing them to ascertain the factors involved, and applying to the problem the knowledge so gained.—F. V. Rand.

10221. HOLMES, N. E., J. C. FIDLER, and C. R. FUR-LONG. The effect of position in the box on the incidence of a physiological injury of the skin in oranges. [Gr. Brit.]
Dept. Sci. and Indust. Res. Ann. Rept. Food Invest. Bd.
1937: 171. 1938.—Fruits from the inside of the box show more physiol, injury of the skin than those in contact with the wood of the box ("outside" fruit).—Authors.

10222. HULME, A. C. The wax content of apple-fruits. [Gr. Brit.] Dept. Sci. and Indust. Res. Ann. Rept. Food Invest. Bd. 1937: 123-124. 1938.—The increase of wax-like substances occurring during maturation of apples kept at 12°C. is 36.1 mg. per 100 g. of tissue for the alcohol soluble fraction and 21.6 mg. per 100 g. of tissue for the alcohol insoluble fraction.—A. C. Hulme.

10223. KIDD, F., and C. WEST. Northern Spy root-stock

and keeping quality. [Gr. Brit.] Dept. Sci. and Indust. Res. and Rept. Food Invest. Bd. 1937: 172-173. 1938.—Samples of Grenadier apples from Northern Spy and Malling XVI root-stocks were stored at 34°, 37°, 40°, 50°, and 70°F. Little difference in keeping quality was found between the 2 lots of fruit. The optimum storage temp. in each case was 37-40°.—Authors.

10224. LAMBERT, EDMUND B., and HARRY HUM-FELD. Mushroom casing soil in relation to yield. U. S. Dept. Agric. Circ. 509. 1-11. 2 fig. 1939.—The tests were made with replicate plots. Within reasonable limits the thickness of the soil was not an important factor. The best time for casing appeared to be two or three weeks after spawning. Soil approx. neutral in reaction yielded better than very acid soil or excessively limed soil. In general, heavy soils yielded better than sandy soils. Under some conditions heat sterilization of soil may be injurious.— Authors.

10225. MANN, C. E. T. Recommendations on the choice of planting material, clones and clonal seedlings. Quart.

Circ. Rubber Res. Scheme Ceylon 15(3): 123-132. 1938.
10226. MORRIS, T. N. The storage of strawberries for canning. [Gr. Brit.] Dept. Sci. and Indust. Res. Ann. Rept. canning. [Gr. Brit.] Dept. Sci. and Indust. Res. Ann. Rept. Food Invest. Bd. 1937: 207-208. 1938.—Optimum conditions for the storage of strawberries for canning consists in bringing the strawberries to 1°C as soon as possible after picking and storing at that temp. One week under these conditions is the limit of successful storage. Removal of the calvx has no deleterious effect on storage.—T. N. Morris.

10227. MORRIS, T. N. The effect of sulphurous acid on the setting power of the pectin of heated fruit pulps. [Gr. Brit.] Dept. Sci. and Indust. Res. Ann. Rept. Food Invest. Bd. 1937: 208-209. 1938.—A steady increase of setting power was obtained after 1 year's storage of extracts from different varieties of plum-pulp with sulphurous acid, but the pectin content did not show greater differences than might be expected as the result of sampling errors.—T. N. Morris.

10228. MURRAY, R. K. S. The care of young budded trees. Quart. Circ. Rubber Res. Scheme Ceylon 15(3): 108-116, 1938.

10229. SCHULZE, GEORG MARTIN. Die Entwicklung zweier Lodoicea seychellarum-Pflanzen im Botanischen Garten zu Berlin-Dahlem. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 13(116): 151-153. 1 fig. 1936.—L. seychellarum (Palmae) is difficult to cultivate. A detailed account is given of 2 seeds germinated in the Berlin Botanical Garden in 1929 and successfully grown.—H. St. John.

10230. SMITH, W. H. Anatomy of the apple fruit. [Gr. Brit.] Dept. Sci. and Indust. Res. Ann. Rept. Food Invest. Bd. 1937: 127-133. 1 fig. 1938—The intercellular volume of the cortex of the apple was measured by an apparatus based upon Boyle's law and was found to bear no definite relation to the size of the cells and weight of the fruit. Large differences were revealed between vars. The cortex from the green side of the fruit had a larger intercellular volume than that of the red side. The number of cells per unit weight of cortex was correlated to the level of respiratory activity, vars. with the largest number of cells per unit weight beying the highest rate of respiration and viice weight having the highest rate of respiration and vice versa-W. H. Smith.

10231. SMITH, W. H. The storage of broccoli. [Gr. Brit.] Dept. Sci. and Indust. Res. Ann. Rept. Food Invest. Bd. 1937: 185-187. 1938.—Storage of broccoli in air at 32°F gave the best results and was superior to gas storage. Further investigations on the effect of manuring and humidity at picking on the development of mould are recommended.—W. H. Smith.

10232. TOMKINS, R. G. The effect of ventilation on the wastage of oranges in storage. Treated wraps for the prevention of rotting. [Gr. Brit.] Dept. Sci. and Indust. Res. Ann. Rept. Food Invest. Bd. 1937: 141-147, 161-162. 1938.— Wastage of wounded oranges by Penicillium digitatum is reduced and retarded by storage in a sufficiently dry atmosphere or by ventilation with sufficiently dry air. Ventilation with saturated air within wide limits or restricted ventilation up to 5% CO₂ does not affect wastage although additions of 10% or more CO₂ may increase. although additions of 10% or more CO2 may increase wastage. Results with sound oranges are similar but not so conclusive. Investigations were carried out on several volatile compounds (higher aliphatic alcohols, phenols, organic

acids, derivatives of benzoic acid, hydrocarbons, chloro- and other derivatives of hydrocarbons) to determine any reduction in fungal rotting without injury or taint when they are incorporated into fruit wraps; some of the hydrocarbons and their derivatives reduced rotting without injury, but caused undesirable tainting; none of the compounds was satisfactory.—R. G. Tomkins.

10233. WEINARD, F. F., and H. B. DORNER. Peonies: Single and Japanese in the Illinois trial garden. Illinois Agric. Exp. Sta. Bull. 447. 93-156. 9 fig. 1938.—Brief descriptions are presented of a large number of vars. tested. The structure of the flowers is discussed, with comments on the distinguishing varietal features. Lists of recommended vars. are included.—Courtesy Exp. Sta. Rec.

FORESTRY

W. N. SPARHAWK, Editor

(See also the section "Economic Entomology—Forest and Shade Trees"; and Entries 8896, 8897, 8934, 8937, 8977, 9013, 9015, 9017, 9020, 9021, 9023, 9028, 9031, 9033, 9036, 9037, 10054, 10118, 10192, 10219, 10288, 10294, 10346, 10352, 10369, 10380, 10381, 10422, 10431)

10234. BOCHET. La conversion des taillis et des taillis sous futaie en futaies feuillues. Rev. Eaux et Forêts 77(1): 23-35. 1939.—Decreasing demand for firewood and increasing demand for industrial timber make it desirable to convert coppice forests into high-forests. Much of this conversion has been accomplished by introducing conifers in place of broadleaf spp. The author discusses the conversion into broadleaf high-forest, which he advocates for suitable sites, particularly where beech will thrive. Conversion into irregular selection forest with a mixture of spp. is preferred to pure, even-aged forests. It is practical even on small holdings.—W. N. Sparhawk.

10235. BRENGOLA, ARTURO. La carta forestale d'Italia. Riv. Forest. Ital. 1(1): 7-10. 2 maps, 2 pl. 1939.—A detailed forest map of Italy, on a 1:100,000 scale, was completed in Oct. 1938. This map, a section of which is reproduced, shows in colors the location and character of the forest cover. About 18% of the country, or 5,700,000 ha., is forested. Slightly less than 41% of this is high forest, a little more than 53% is simple coppice, and 5% is coppice-

with-standards.—W. N. Sparhawk.

10236. CHOPRA, R. S. A rough guide to thinning deodar based on average spacing for a given girth. Indian Forester 64(11): 651-652. 1938.—In the deodar forests of qualities I and II in the Punjab, thinning intensity at each decade is regulated by the "4 times the girth" thumb-rule, i.e., the avg. spacing after each thinning approximates 4 times the mean tree girth at breast height. Besides being simple in practice, it compares favorably with the Forest Research Institute

multiple yield tables for deodar.—J. N. Sen Gupta.

10237. DE, R. N. Sal inflorescence. Indian Forester 64
(8): 502. 1938.—In the Goalpara district (Assam) sal trees were observed, standing side by side, not near water, 1 carrying pink flowers, 1 cream and the 3rd intermediate between the others. The redder wood is believed to be more durable.-J. N. Sen Gupta.

10238. DEINES, GEORG. Die Forstliche Standortslehre. Mitteil. Forstwirtsch. u. Forstwiss. 9(4): 387-532. 60 fig. 1938.—This is an endeavor to clear up the existing confusion in description and mapping of forest sites, as a basis for scientifically sound forest management. As defined by Ramann, forest site theory deals with the development of forest trees, their interrelation with the soil, and their dependence on climatic factors. In Part I (pp.389-395) the concept of "forest site theory" and its relation to soil science, meteorology, and plant science are discussed. Part II (pp.395-484) deals with forest site theory in general, covering the historical development of forest soil and vegetation in Germany, and the components of site—climate, tree spp., soils. Classifications of soils, water relations ("Wasserhaushalt"), etc., are outlined. Part III (pp.484-530) takes up the field and laboratory procedure in investigating and describing sites, and methods of presenting the results.-W. N. Sparhawk.

10239. DEMETRESCU, ILIE C. O lipsă sistematică a răriturilor in România. [A frequent fault in making thinnings in Rumania.] [With Fr. summ.] Rev. Pădurilor [Bucharest] 51(1): 22-29. 6 fig. 1939.—A defect in thinning practice in Rumanian forests consists in opening the stand to entrance of drying winds. To repair the damage it will be necessary to plant shelter belts or wind mantles along the edges of the open forests.—W. N. Sparhawk.

10240. DONON, F. Abatage du sapin "President de la

Joux." Bull. Trimest. Soc. Forest. Franche-Comté et Prov. Est 23(1): 5-11. 2 pl., 2 fig. 1939.—An account of the felling of a large fir (Abies alba) in the Joux State forest in France. The tree was 53.5 m. tall, 4.6 m. in circumference at 15 m. above the ground, and contained about 40 cu.m., including bark. It was approx. 270 yrs. old.—W. N. Sparhawk.

10241. ENGEL, ANDRE. Les effets de la grêle en forêt.

Bull. Trimest. Soc. Forest. Franche-Comté et Prov. Est 23(1): 12-20. 4 pl. 1939.—Trees of several spp., severely damaged by hail in 1935, had almost recovered by 1938, excepting the oaks, on which the scars had not yet healed over.—W. N. Sparhawk.

10242. EYRE, FRANCIS H., and JOHN R. NEETZEL.

Practical cutting methods for northern hardwoods. Papers Michigan Acad. Sci., Arts and Lett. 24(1): 197-208. 4 fig. 1938(1939).—Exptl. cuttings in northern hardwoods indicate for a 10-yr, period an annual yearly growth of 226 board feet for light selective cuttings, 188 board feet for moderate cuttings, and 98 board feet for heavy cuttings. Value increment is accentuated even more in the light cutting since the growth is mostly added to the larger and more valuable

trees. Advantages and disadvantages are given for each of the three types of cuttings.—F. H. Eyre.

10243. FABRICIUS, L. Forstliche Versuche XXI. Kalkdüngungsversuch I. Forstwiss. Centralbl. 61(5): 129-137. 1 fig. 1939.—Pinus silvestris seed was sown and 2-yr. pine seedlings and 3-yr. Picea abies seedlings were planted in the spring of 1929 on a series of plots, to the alternate ones of which ground limestone was applied at the rate of 5,000 kg. per ha. Heights of the plants were measured in the fall of 1934 and again in 1938. Heights of both pine and spruce were up to 20% greater on the limed than on the unlimed plots; annual growth on the limed plots was greater for more than 6 yrs. After 10 yrs. the planted pines were still further ahead of those from the seeding than would be accounted for by the difference in age. In mixtures, spruce grew best where the pine grew slowest, i.e., on the plots sown with pine seed. The plant cover was simulated in growth but not changed in composition by liming. Broom (Sarothamnus) favored the growth of spruce but not of pine.-W. N. Sparhawk.

10244. FLORENT, A., L. COLLETTE, et C.-J. DUTERME. L'excursion annuelle de 1938. Bull. Soc. Centr. Forest. Belgique 46(2): 57-73. 1939.—Forests and forest management in Belgium are descr. Plantations of Douglas fir have been especially successful. In one instance, a 29-yr.-old stand of Douglas fir has produced 14.1 cu.m. of wood per ha. per annum, compared with 7.5 cu.m. for a 53-yr.-old stand of spruce on a similar site. A 29-yr.-old stand of Douglas fir

planted under Scotch pine produced more than 10 cu.m. per ha. per annum.—W. N. Sparhawk.

10245. FORBES, A. C. Water-washed soils and their afforestation. New Zealand Jour. Forest. 4(3): 148-157.
1938.—Some gravels and sands in Tertiary and Quaternary deposits in Great Britain and Ireland, resulting mainly from prolonged washing during the glacial period, are so infertile as to be of little value for agriculture or forestry. Failure of planted trees may be due to the absence of mycorrhizas. Rayner's expts. with application of organic composts (chopped straw, brewery hops waste, sawdust) with ammonium compounds indicate such soils can be afforested .-W. N. Sparhawk.

10246. FREISE, FRIEDRICH W. Beobachtungen in

Zweitwuchsbeständen aus dem Küstenurwaldgebiet Brasiliens. Zeitschr. Weltforstwirtsch. 6(5): 281-299. 1939.—This is a study of forest succession on impoverished and abandoned cultivated land in eastern Brazil. These 2d-growth forests, which occupy some 18,000 sq.km., are mostly less than 40 yrs. old, although some are 80 yrs. old. The 1st tree generation consists of fast-growing, short-lived spp., mostly with soft wood; 83 spp. belonging to 63 genera and 40 families are listed, with information on their abundance, length of life, and the time of their appearance in 2d-growth stands. Many of these spp. do not occur in the closed virgin forest. Left to itself, the 2d-growth forest is a temporary form that will give way to a new virgin forest within 150-200 yrs., after 3-8 generations of 2d-growth tree spp. The 2d-growth forest is fairly uniform in composition throughout the region, irrespective of the variations in composition of the original forest. In artificially reforesting land that was formerly cultivated, only the fast-growing, short-lived spp. should be grown during the 1st 20 yrs. in order to prepare the soil for the more valuable virgin forest spp. After 20 yrs. mixtures of these valuable spp. should be sown.—W. N. Sparhawk.

10247. GRIFFITH, A. L. [1] An investigation into the best root length of stump to use when stump planting teak (Tectona grandis) in areas having a general west coast type of climate. [2] An investigation into the relative merits of planting teak (Tectona grandis) stumps in pits and in crowbar holes in areas having a west coast type of climate. Indian Forest Rec., Silviculture 3(1): 1-15; (3): 47-59. 1938. -[1] 11 expts. conducted at 4 centers over a 4-yr. period (1932-1935) showed from a consideration of the survival % and mean height growth at the end of the 1st growing season, that there are no appreciable differences in results from stumps within the root range of 6" to 10". A root length of 4" gave poorer results. (A stump is a root-and-shoot cutting made from a 1-yr.-old nursery seedling.) Stumps of 0.7-0.8 inch diam. gave better results than those of 0.3-0.4 inch diam. The expts. were done in places having a general West Coast type of climate with a mean annual rainfall varying from 60 to 120 inches and at elevations from the plains up to 3,000 feet. The soils at all centers were light forest soils, naturally well aerated.—[2] 11 expts. conducted at 5 centers over a 3-yr. period (1932-1934) showed that there are no appreciable differences in results from teak stumps planted in pits from those planted in crow-bar holes. As pitting is much the more expensive method of soil preparation for planting it is not economically justified.—From auth. abst.

10248. HAKIMUDDIN, M. Fence posts. Indian Forester 64(12): 749-750. 1938.—With reference to an earlier article on "treating fence posts by means of old inner tubes," the author advocates a still cheaper and simpler method of increasing the life of posts by scorching (to a depth of about ½ inch) the lower ends after removing the bark. Scorching or charring is a very old form of wood preservation, which originated in the ship-building industry.—J. N. Sen Gupta.

10249. HASSENBERGER, R. Fichtenformen und Fichtenrassen im Glatzer Schneegebirge. Zeitschr. Forst- u. Jagdwesen 71(3): 113-140. 10 fg. 1939.—The spruce forests of the Schneegebirge (eastern part of the Sudeten Range) have suffered severe damage from snow breakage. Spruce of the local geographic race is much less susceptible to such damage than that introduced from other regions, owing to differences in form and branching habits. At middle altitudes (700-1,000 m.), uneven-aged mixed stands such as originally occupied the area have not suffered as much as pure stands of spruce. Above 1,000 m. the original forest was practically pure spruce with an understory of Sorbus; here the snow is drier and does not stick to the trees as it does at lower altitudes, and the form of the spruce is quite distinct from that in the zone below. Loss from snow breakage in the future can be minimized by cutting out the spruce of "foreign" origin and building up mixed stands of native spruce with fir and broadleaf spp. Thinning should commence early and should favor the spruce of local race. Stand density should decrease with increase in altitude.—W. N. Sparhawk.

10250. HEYWARD, FRANK. Some moisture relationships of soils from burned and unburned longleaf pine forests. Soil Sci. 47(4): 313-325. 2 pl. 1939.—In a 1-year

study of moisture in longleaf pine forest soils subjected to frequent fires as contrasted with soils protected from fires, the following findings are reported: For each of the 3 depths studied, 0- to 2, 4- to 6, and 8- to 10 inches, the soil protected from fires was more moist. In absolute values the differences in moisture percentage were small, but in relative values the soil protected from fire was as much as 52% moister than the soil on burned areas. Differences between moisture retention, detd. in the laboratory, of the 2 treatments of soils studied were neither sufficiently large nor consistent enough to account for the large differences found in field moisture percentage. The differences in field moisture were attributed to the presence of a loose mulch comprised of a thick mass of perennial grasses including much dead material on the unburned areas as contrasted with a sparse ground cover on burned areas which in spots left the soil completely exposed.—F. Heyward, Jr.

10251. HUSSAIN, M. T. Regeneration of semal (Bombax malabaricum) from root suckers. Indian Forester 64(7): 398-400. 1938.—Results of expts. in trenching around stumps of B. malabaricum showed that regeneration by root suckers can be obtained by cutting or bruising large lateral roots of standing trees or of freshly felled stumps. Cutting the roots far away from the tree did not give good results. Fencing against deer was essential for the survival of the suckers. The avg. height growth in the 1st season was about 5 ft.—M. V. Laurie.

10252. JANSON, R. W. G. Thoughts on silver beech management. New Zealand Jour. Forest. 4(3): 138-141. 1938.—Silver beech (Nothofagus menziesii) grows rapidly and regenerates freely if given a reasonable amount of light. Most of the stands are more or less decadent. Natural regeneration may be stimulated by opening up the stands where beech seed trees are present, and by burning of slash on recently logged areas.—W. N. Sparhawk.

10253. KOVACS, ERNÖ. Az erdőlési kísérletek föbb

10253. KOVACS, ERNÖ. Az erdőlési kísérletek föbb fatermési eredményei. [Expts. on the effect of thinning on timber yields.] [With Ger. summ.] Erdészeti Lapok 78(3): 224-248. 1939.—Results of thinning expts., mainly with beech, pine, and spruce, lead to the conclusion that intensity of thinning has little influence on yield and that heavy thinning is not particularly advantageous except with long rotations where it is desirable to keep the investment in growing stock within economic limits.—W. N. Sparhawk.

10254. KRISHNAN, E. K. Cammiphora caudata for the avenue. Indian Forester 64(12): 751-752. 1938.—This sp., otherwise known as Protium caudatum, is easily propagated from stem and branch cuttings. The writer's expts. since 1924 have given complete success with such cuttings in spite of careless handling and even in unfavorable seasons. Cuttings were 6 ft. long and 2-3 inches in diam.; 2 ft. of the stem was embedded firmly in soil, which was watered for a week or 2 if the weather was dry. Even branches 10 ft. long and 2 inches in diam. with leaves intact, planted late in May, gave good results. The wood is useless and leaves are unpalatable to cattle.—J. N. Sen Gupta.

10255. LAURIE, M. V. A rough guide to thinning teak

10255. LAURIE, M. V. A rough guide to thinning teak based on average spacing for a given mean diameter. Indian Forester 64(7): 397-398. 1938.—Yield-table data for teak indicate that the average spacing in feet is roughly 1.5 (d+3) where d is the mean crop diam. in inches. Assuming minimum spacing to be $\frac{2}{3}$ of the avg. spacing, a rough guide for thinning teak is that no 2 trees should be left closer together than (d+3) feet, d being the diam. in inches of the tree it is desired to retain. This formula may be a simple and useful guide in thinning uneven-aged teak forests.—M. V. Laurie.

10256. LAURIE, M. V. Branching and seed origin in Coorg teak plantations. Indian Forester 64(10): 596-600. 5 pl. 1938.—4 types of branching in Coorg teak plantations are deser, and illus, and the probability of their being due to hereditary factors discussed. Vars, grown from seed from dry localities may have considerably exaggerated characteristics when raised in damper and more favorable conditions. The necessity for ascertaining that the seed comes from a good origin when making teak plantations is emphasized.—Auth. abst.

10257. LAURIE, M. V. Root competition and available nitrogen in the soil. *Indian Forester* 64(11): 652-655. 1938.—The vegetative response to removal of root competition in

trenched plots was formerly explained as being due chiefly to increased available soil moisture. Recent work in spruce forests in Sweden suggests that increase in available N may be the chief factor, and that this is correlated with the killing of mycorrhizal fungi.—Auth. abst.

10258. MAGALPINE, R. I. Mixture of species in planta-

tions. Indian Forester 64(9): 574-583, 1938,—The difficulty in standardizing mixtures in terms of rotation, uses, locality, etc., is emphasized. From the provisional data collected, 2 curves of breast-height-girth/age were drawn to show ages at which various Bengal spp. might be expected to attain 6 feet girth over bark. Of the several plantation mixtures experimented with, the more practicable are (1) alternate groups of strips, (2) alternate lines, (3) mixed seed sowings in lines and (4) quincunx. The 1st is the most promising.-J. N. Sen Gupta.

10259. MARTÍNEZ, JOSÉ GARCÍA. La explotación de los pinos en México. México Forestal 16(10/12): 63-77. 1938.—The 26 spp. of Pinus (according to P. C. Standley's system, as modified by Maximino Martínez) are listed, with a key for their identification and brief descriptions of trees and wood and general distrib. of each in Mexico. The area of pine forest (given by States) is estimated at slightly less than 2 million ha. out of a forest area of about 20 million ha. Durango and Chihuahua have more than ½ of the pine area. Other States with more than 60,000 ha. are Michoacan. Veracruz, México, Coahuila, Tamaulipas, Jalisco, and Nuevo

León.-W. N. Sparhawk.

10260. MITCHELL, J. E. M. Note on sandal regeneration. Indian Forester 64(9): 541-551. 1938.—Sandal is usually found on rocky and gravelly soils in open scrub forests, hedge rows, lantana bushes and bamboo clumps in Coorg, Mysore and some districts of Madras and Bombay Presidencies between elevation of 2000' to 4000'. For its proper development, the sandal tree depends upon the host trees. Sandal can be raised profitably in plantations in semi-evergreen forests, either by clear-felling compact areas (leaving about 20 standards per acre as hosts) or in 12 ft. wide strips at intervals of 50 ft., burning the slash and sowing seed at 12' intervals with subsequent weeding operations as required. Cassia siamea, a good host plant, may also be usefully sown along with sandal.—J. N. Sen Gupta.

10261. NEMEC, ANTONÍN. Vliv hnojení kompostem na vzrůst sazenic smrku v lesních školkách. [Influence of com-

post fertilizing on the growth of spruce in forest nurseries.] [With Ger. summ.] Lesnická Práce 18(3): 148-156. 1939.-The influence of compost application at the rate of 30 kgm. per sq. meter on the growth of 3-yr. spruce transplants was studied. On soils rich in lime, growth was stimulated where N was deficient; on soils poor in lime, growth was less than without the compost. On poor soils compost needs to be supplemented with mineral fertilizer.—W. N. Sparhawk.

10262. NEMEC, ANTONÍN. K otázce výživy olše na chudých půdách. [Feeding of alder on poor soils.] [With Ger. summ.] Lesnická Práce 18(1/2): 26-35. 1 fig. 1939.—Alder requires considerable lime. It is well suited for afforestation of bare limestone soils, but does not thrive on acid soils. On degraded hardpan soil deficient in lime, black alder grew poorly and ash analysis of the leaves showed deficiencies in lime, magnesia, and phosphoric acid. With application of Mg-bearing limestone sediment together with Ca phosphate and $Ca(NO_s)_2$ the growth was excellent.— W. N. Sparhawk.

10263. NĚMEC, ANTONÍN. Pokusy s hnojením polařených lesních půd v oblasti vojenských lesních podniků v Malackách. [Expts. on fertilizing forest soils in connection with intermediate use for agricultural crops, in the Malacky military forest.] [With Ger. summ.] Shor. Česk. Akad. Zem. 13(4): 638-649. 4 fig. 1938(1939).—This forest, which is in a semi-arid drift sand area in western Slovakia, consists mostly of Scotch pine, with some oak. Pine is usually planted following 2-4 yrs. cultivation of rye, millet, or potatoes. The soil generally lacks P₂O₅ and potash, and contains little lime but some N compounds, so crop yields are only about 1/10 of those in good soil. Fertilizers used to increase the yield of potatoes remained largely available for the succeeding pine plantation, when the potato tops were left between the furrows.—W. N. Sparhawk.

10264. NEMEC, ANTONIN. Vliv jednostranného hnojení

fosforečnými hnojivy na výživu sazenic smrku v lesních

školkách. V. Vliv hnojení na resorpci manganu. [Influence of unbalanced P₂O₅ fertilizing on spruce plants in forest nurseries. V. Influence on intake of Mn.] [With Ger. summ.] Sbor. Česk. Akad. Zem. 13(4): 649-657. 1938(1939).—The intake of Mn by spruce needles depends on soil acidity and the content of readily soluble Mn compounds in the soil; it varies inversely with CaO and MgO content. Fertilizing with P2O5 increases Mn intake on neutral and acid soils. On soils rich in Mn but poor in P2O5, fertilizing increases the intake of Mn but reduces that of P_2O_5 ; on those poor in Mn the intake of P_2O_5 but not of Mn is increased. Mn intake on both fertilized and unfertilized soils increases and lime intake decreases with decreased lime content of the soil.-W. N. Sparhawk.

10265. PARKER, R. N. Experiments with exotics. Indian Forester 64(12): 717-723. 1938.—Some do not believe in the introduction of any exotics; others consider them all right for horticulture and agriculture but not for forestry, overlooking the fact that exotics like Casuarina, mulberry and Eucalyptus spp. have long been successfully naturalized in many parts of India. Aimless experimenting is deprecated; the main considerations should be (1) that the exotic sp. has some quality such as rapid growth, valuable timber, or ease of cultivation, giving it an apparent advantage over the indigenous plants; (2) that it comes from a similar climate; (3) that something is known of its silvicultural requirements; and (4) that the 1st trial should be on a small scale and in an accessible locality.-J. N. Sen Gupta.

10266. PAVARI, ALDO. Le razze forestali e la provenienza del seme. [Races of forest trees and source of seed.] Riv. Forest. Ital. 1(1): 11-20. 7 fig. 1939.—This is a summary of work in various countries of northern and central Europe on racial variation in forest trees, particularly Picea excelsa, Pinus silvestris, Larix europea, and Quercus pedunculata.—

W. N. Sparhawk.

10267. PERHAM, A. N. Pacific coast species in N. Z. forestry. New Zealand Jour. Forest. 4(3): 158-161. 1938.— At least 95% of the 700,000 acres afforested in New Zealand has been planted with trees from the Pacific coast of N. America, especially Pinus radiata, P. ponderosa, P. murrayana, P. muricata, Pseudotsuga taxifolia, Sequoia sempervirens, Chamaecyparis lawsoniana. Thuya plicata, and Cupressus macrocarpa.—W. N. Sparhawk.

10268. ROHMEDER, E. Wachstumsleistungen der aus

Samen verschiedener Grössenordnung entstandenen Pflanzen. Forstwiss. Centralbl. 61(2): 42-59. 1939.—Seed from 9 spruce trees, graded into 3 size-classes, was sown in the spring of 1936. In the fall of 1938 the heights and wts. of 600 plants from each size-class were measured. Although the ave. heights and wts. of plants from large seed were greater and those from small seed were smaller than those from ave. seed for the 9 parents combined, this was not the case with all of the individual trees, nor were the differences more than 2-3 times the probable errors of sampling. There was clear correlation between wt. of seedling and size of seed for only 3 of the 9 trees, and between height of seedling and size of seed for only 2. Ave. plants from the smallest seed of some trees were larger than those from the largest seed of others, which indicates that heredity plays a greater rôle than size of seed. There was no correlation between ave. size of seed and seedlings and the crown class of the parent trees, for the smallest ave. seedlings came from dominant parents. In collecting seed for reforestation, that from each individual tree should be kept separate so as to ascertain which parent trees produce fast-growing progeny. Subsequently, seed should be collected only from those trees. The work of other investigators on the relation of seed size to growth of seedlings is reviewed. All agree that heavier seed produces larger and more vigorous seedlings that are better able to resist the dangers of early yrs. than those from small seed. This difference generally disappears within 10 yrs., and after that hereditary factors have greatest influence on growth of the trees.-W. N. Sparhawk.

10269. RÜŽIČKA, JAROSLÁV. Vejmutovka. [Pinus strobus.] [With Ger. summ.] Lesnická Práce 18(3): 126-148. 1939.—P. strobus, introduced into central Europe in 1755, is one of the most valuable exotic trees planted there. Its site requirements and growth habit and the quality and uses of the wood are outlined.—W. N. Sparhawk.

10270. SINHA, J. N. A note on laurel wood (Terminalia

tomentosa) and its market in Great Britain. Indian Forester 64(11): 669-674. 1938.—Figured laurel is much fancied in England. India at present supplies a quantity and the market is expanding. But "figure" partakes so much of sentiment that it is hard to define. It is hard to tell if any given log would yield figured timber, and ordinary laurel wood is not cared for. In this article the opinions of certain British brokers and merchants are pooled and hints for exporters are given.—Auth. obst.

exporters are given.—Auth. abst.

10271. SMYTHIES, E. A. The taungya plantations of Bhinga, Bahraich division, U. P. Indian Forester 64(8): 471-482. 9 pl. 1938.—The forest of Bhinga was slowly dying, as heavy grazing and uncontrolled removal of small poles had prevented reproduction. The 1935-36 working plan set apart about 33 sq. mi., to be intensively worked and regenerated by taungya, with a view to meeting village requirements. About 400 acres per annum are clear-felled and regenerated with valuable timber and fodder spp. The technique is described.—J. N. Sen Gupta.

10272. THOMAS, A. V. Nyalas. Malayan Forester 8(1): 27-28. 1939.—Parastemon urophyllum occurs in the Malay Peninsula, Sumatra, Borneo, and adjacent islands, usually in

reshwater swamps. The timber is hard, heavy, stiff, and difficult to saw owing to its silica content.—W. N. Sparhawk. 10273. TROTTER, H. Treating fence posts by means of old inner tubes. Indian Forester 64(9): 551-556.3 pl. 1938.—Describes a cheap and simple method of treating green fence posts and other round green timber with water soln. preservatives, by using pieces of old motor car inner tubes attached to one end of the posts. The method is a simple modification of the Boucherie process, and is well suited for fencing operations in the forest.—Auth. abst.

for fencing operations in the forest.—Auth. abst.

10274. TSCHERMAK, L. Wald und Waldbau in Oesterreich. Wiener Allg. Forst- u. Jagd-Ztg. 57(6): 37-38; (7): 43-44; (8): 51-52. 1939.—One of the most important types of forest in Austria is the spruce-beech-larch-fir mixed forest, with or without pine. A major silvicultural problem is to retain the mixture, which necessitates natural regeneration of the fir and bosch at least. W. N. Sandraul.

of the fir and beech, at least.—W. N. Sparhawk.

10275. VENKATA RAO, M. G. The influence of host plants on sandal and on spike disease. Indian Forester 64 (11): 656-669. 3 pl. 1938.—Good and bad hosts of sandal can be differentiated only when grown individually with sandal, not on the basis of selective tendency of haustorium. Details are given of cases of (a) hosts easily killed by sandal, (b) toxic hosts which kill sandal, (c) hosts which cause discoloration in leaves of sandal, and (d) hosts which alter the habit of sandal. The sandal haustoria not only absorb the crude sap from host plants but often take up other ingredients found in their roots. Attempts at classifying any sandal-host combinations as "more susceptible" and "less susceptible" to the disease are considered futile and misleading, for the differences in resistance, if any, are generally slight and often not beyond exptl. errors.—J. N. Sen Gunta.

Sen Gupta.

10276. VINCENT, GUSTAV. Jak usměrnit pěstební zásahy v lesích nového Česko-Slovenska? [Silvicultural management of the forests of the new Czecho-Slovakia.] [With Ger. summ.] Lesnická Práce 18(1/2): 1-26. 10 fig. 1939.—To increase quantity production, the author recommends the cultivation, on suitable sites, of fast-growing spp.

such as Populus tremula, P. tremuloides, P. canescens, and P. balsamifera. To increase quality production, he advocates care in using races of the principal spp. that are adapted to the sites in question, conversion of pure beech to mixed stands, more intensive thinnings and other cultural measures, and pruning. Methods are descr.—W. N. Sparhawk.

stands, more intensive timings and done distural measures, and pruning. Methods are descr.—W. N. Sparhawk. 10277. WARREN, W. D. M. Crown ratio in Indian trees. Indian Forester 64(7): 435-437. 1938.—The utility of "crown ratio" or rather the "diam. ratio" (i.e., the ratio between the mean diam. and the mean spacing between stems) as a practical guide in thinnings is discussed. A ratio of 1:18 is reported to work well for Shorea robusta of good quality.—M. V. Laurie.

10278. WILKINSON, G. Root competition and silviculture. Malayan Forester 8(1): 11-15. 1939.—Believing that root competition has greater influence than light on the regeneration and growth of individual trees in the forest, the author has tentatively classified the root forms of a number of Malayan trees, according to the presence or absence of taproots and laterals.—W. N. Sparhawk.

10279. WOHLFARTH, ERICH. Vom Aufbau des Plenter-

10279. WOHLFARTH, ERICH. Vom Aufbau des Plenterwaldes. Zeitschr. Forst- u. Jagdw. 71(2): 79-100.9 fig. 1939.—
The true selection forest is characterized especially by irregularity of crown levels (absence of a distinct crown layer or layers) and by fewer dominant and codominant and more intermediate and understory trees than occur in an even-aged forest. Although it is generally believed that only shade-tolerant spp. such as fir, spruce, and beech are suitable for selection management, this system can be used with intolerant spp. such as Pinus silvestris; in fact, it is the common practice in small farm woods in Germany. The number of trees per ha. remains fairly constant in a selection forest; the range of diams. is generally wider than in other forms of forest and the distrib. of diams. is quite different. Various combinations of small, medium, and large trees are possible in a selection forest; a typical combination is 60% small (8-14 cm. diam.), 30% medium (16-36 cm.), and 10% large trees (38 cm. and over).—W. N. Sparhawk.

10280. ŽABKA, JOSEF. Pinus nigra Arn., jeji variety a lesnický význam, zvláště odrůdy rakouski. [Pinus nigra, its varieties and silvicultural importance, especially v. austriaca.] [With Ger. and Fr. summ.] Lesnická Práce 18(3): 117-125. 1939.—Of the 4 geographic races or vars. of P. nigra, v. austriaca and v. calabrica are of considerable importance for Czecho-Slovakia, while v. pallasiana and v. cebennensis have little value. There are also several hybrids, with P. silvestris and P. montana.—W. N. Sparhawk.

10281. ANONYMOUS. Graphs giving volume/age for the

10281. ANONYMOUS. Graphs giving volume/age for the more important species found in the northern and southern Bengal, compiled in the office of the Silviculturist, Bengal. Bengal Forest Bull. 2. Part 1. 1938.—The graphs were prepared from stem analyses. The quality or locality classes were not taken into consideration and the data give only rough indications of rates of growth of the spp. mentioned.— J. N. Sen Gupta.

10282. ANONYMOUS. India aids the Sudan. Indian Forester 64(9): 573-574. 1938.—The nim (Azadirachta indica) tree of India is now acclimatized in the Sudan and has proved a satisfactory windscreen for the protection of plantations.—J. N. Sen Gupta.

PHARMACOGNOSY AND PHARMACEUTICAL BOTANY

HEBER W. YOUNGKEN, Editor

(See also in this issue Entries 9027, 10144, 10183, 10198, 10332, 10338, 10340, 10464, 10466, 10476, 10531)

10283. BALLY, P. R. O. Native medicinal and poisonous plants of East Africa. Bull. Miscell. Inform. Kew 1937(1): 10-26. 1937.—An account of the author's recent researches into the native uses of E. African plants. A systematic enumeration of the plants is given, with their tribal names, uses and parts employed.—J. H. Hutchinson.

10284. BLATT, A. H. A critical survey of the literature dealing with the chemical constituents of Canabis sativa.

10284. BLATT, A. H. A critical survey of the literature dealing with the chemical constituents of Cannabis sativa. Jour. Washington Acad. Sci. 28(11): 465-477. 1938.—Extracts from Cannabis have furnished 2 chemical individuals and 3 additional products not isolated as pure substances. The

chemical individuals are n-nonacosane, $C_{29}H_{20}$, and cannabinol which is very probably (I)

$$CH_3$$
 C_5H_{11}
 C_5H_{12}
 C_5H_{13}
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The other products are a terpene, C₁₀H₁₆, b.p. 160-180°, a sesquiterpene, C₁₅H₂₄, b.p. 258-259°, and crude cannabinol, a high boiling oil. The narcotic activity is found in the crude cannabinol but the substance or substances responsible for this activity have not been isolated. The chem. and physical properties of cannabinol and crude cannabinol are described and definitions of Cannabis and the more important preparations made from it are appended to the article. A. H. Blatt.

10285. BRIESE, R. R., and JAMES F. COUCH. A study of the iodine test for toxicity in sorghum. Amer. Jour. Pharm. 110(8): 356-361. 1938.—The iodine test for the detection of dangerous quantities of HCN in cyanogenetic plants [see B. A. 9(9): Entry 17930] is unreliable. Tests applied to 625 samples and compared with the HCN found by chem. analysis indicated that the quantity of HCN which may be obtained from the plant bears no relation to

which may be obtained from the plant bears no relation to the depth of color produced in the iodine test.—Authors.

10286. BRIGGS, L. H., and W. S. TAYLOR. Sophora alkaloids. II. The alkaloids of the seeds of S. tetraptera. Jour. Chem. Soc. [London] 1938(Aug.): 1206-1208. 1938.

10287. CLEMO, G. R., W. M. MORGAN, and R. RAPER. The lupin alkaloids. XIII. The resolution of dl-lupinine. Jour. Chem. Soc. [London] 1938(Oct.): 1574-1575. 1938.

10288. COUCH, J. F., and REINHOLD R. BRIESE. Note on cyanogenesis in Liriodendron tulipifera L. Jour. Washington Acad. Sci. 28: 477-478. 1938.—Tulip-tree leaves conington Acad. Sci. 28: 477-478. 1938.—Tulip-tree leaves contain cyanogenetic compounds. Leaves collected May 30 from a mature tree gave 62 mg% HCN as against 7.1 mg% from leaves collected Sept. 13. Leaves from seedlings gave 35.1 mg% HCN and from 2 year old trees, 23.3 mg%, both collected in Sept. All these figures are calculated on the dry weight of the leaves. Tulip tree does not contain enough

HCN to be very dangerous to livestock.—Authors. 10289. CWALINA, GUSTAV E., and GLENN L. JENKINS. A phytochemical study of Ipomea pes-caprae. Jour. Amer. Pharm. Assoc. 27(7): 585-595. 1938.—The aerial portion of I. pes-caprae, a denizen of nearly every tropical beach, was investigated phytochemically. The roots and leaves have been used in the Indian materia medica in the treatment of dropsy, rheumatism, etc. The ash contained the sulfate, chloride, and carbonate radicals and the following metals; Sn, Fe, Mg, Ca, Na, and K. The drug yielded 0.048% of volatile oil which distilled between 127 and 145°C at 20 mm.; sp. gr. 28°/28°C—0.9626; refractive index at 26°C—1.4703. Tests for alkaloid were negative. The total resin content of the drug was 7.27%. Extraction of 9 kg. of the drug with petroleum benzin (b.p. 30-60°C) yielded 3.91% of extractive. From the unsaponifiable portion of this extract were isolated pentatriacontane, triacontane, and a sterol melting at $136-137^{\circ}$ C, specific rotation $(28^{\circ}/D) = -51.54^{\circ}$, mol. wt. from saponification of acetate = 458.4. From the molecular weight and combustion analyses the formula C29H40OH is proposed. The saponifiable portion of the benzin extract yielded behenic acid, melissic acid, butyric acid, and myristic acid. The presence of glycerol and of an unsaturated fatty acid was demonstrated. The crude drug, after petroleum benzin extraction, was extracted with 95% ethyl alcohol and yielded 7.43% of extractive. This extract yielded volatile oil, butyric acid, chlorophyll, resin, inorganic crystals consisting of sodium and potassium chlorides, and a catechol tannin. Various extractives administered to cats failed to give a response.—G. E. Cwalina.

10290. DIETERLE, H., und K. SCHWENGLER. Über Kanthoxylin S, einem Inhaltsstoff von Kanthoxylum carolinianum. II. Arch. Pharm. u. Ber. Deutsch. Pharm. Ges. 277(1): 33-44. 1939.

10291. GUNDE, B. G., and T. P. HILDITCH. The seed and fruit-coat fats of Neolitsea involucrata. Jour. Chem. Soc. [London] 1938(Oct.): 1610-1614, 1938.

10292. HILDITCH, T. P., and M. L. MEARA. The seed fat of the annual nasturtium (Tropaeolum var.). Jour. Chem. Soc. [London] 1938(Oct.): 1608-1610. 1938.

10293. KRUKOFF, B. A., and A. C. SMITH. Notes on the botanical components of Curare. II. Bull. Torrey Bot. Club 66(5): 305-314. 1939.—Plants used in prepn. of arrow-poison by the Canelos Indians of Ecuador are listed. The principal components are Menispermaceae (Chondodendron iquitanum, C. tomentosum, and Sciadotenia toxifera). Secondary ingredients are spp. of Strychnos.-Authors.

10294. LUNDELL, CYRUS LONGWORTH. Plants probably utilized by the Old Empire Maya of Petén and adjacent lowlands. Papers Michigan Acad. Sci., Arts and Lett. 24(1): 37-56. 1938(1939).—The plants are divided into the following classes: human foods, timber trees and other plants used in construction, materials for dugouts, fiber plants, dye plants, decorations, shade trees and ornamentals, and miscellaneous useful plants. Under each class an annotated list of

the important spp. is presented.—C. L. Lundell.
10295. ST. PFAU, ALEXANDRE. Etudes sur les matèries végétales volatiles. IX. Sur quelques constituants inédits de L'huile essentielle de rue. Helvetica Chim. Acta 22(2): 382-391. 1939.—The essential oil of Algerian rue (Ruta montana) contains, in addition to known constituents, methyl-n-amyl ketone, methyl-n-hexyl ketone, benzoic and cuminic aldehydes, paracymene, phenol, carvacrol, guaiacol, vanillin, capronic, caprylic, capric, lauric, myristic, palmitic, anisic, and salicylic acids, capric and palmitic esters, the methyl ether of unbelliferone, and xanthotoxin; also the following, not previously reported in essential oils, -a and β-anethol glycols, a lactone, C15H14O2 (rutolid), and the dioxime of n-heptane-dione-3, 4. All of these are present in amounts of 0.1% or less.—Auth. summ.

PLANT PHYSIOLOGY, BIOCHEMISTRY, AND BIOPHYSICS

F. E. DENNY, Editor

(See also in this issue Entries 8896, 8909, 8925, 8933, 8935, 8937, 8944, 8981, 9023, 9027, 9105, 9163, 9283, 10045, 10048, 10103, 10107, 10166, 10169, 10175, 10179, 10182, 10183, 10188, 10193, 10194, 10197, 10198, 10217, 10218, 10220, 10222, 10230, 10286, 10287, 10288, 10290, 10291, 10292, 10364, 10376, 10379)

ABSORPTION, NUTRITION

10296. FOSTER, JACKSON W. The heavy metal nutrition of fungi. Bot. Rev. 5(4): 207-239. 1939.—A comprehensive review of the literature dealing with various aspects of the heavy or "trace" element nutrition of filamentous fungi is presented. The importance of heavy metal impurities in reagent chemicals, in glassware, and in water, is discussed; methods, sources of contamination and error, and purification techniques are given. The various theories which explain the functions of heavy metals on the growth of molds and other fungi are presented, with emphasis placed on the catalytic action of these metals. The influences of Zn, Fe, Mn, and Cu on the morphological, cultural and physiological characteristics of these organisms are treated in detail. Other metals are also considered. A list of 152 references is appended.-J. W. Foster.

10297. STOUT, P. R., and D. I. ARNON. Experimental

methods for the study of the role of copper, manganese, and zinc in the nutrition of higher plants. Amer. Jour. Bot. 26 (3): 144-149. 1939.—Careful removal of heavy metal contaminants from the nutrient medium made possible consistent demonstrations of early deficiency symptoms in young tomato plants grown in minus copper, minus zinc and minus manganese nutrient solutions. The technique involved the use of (a) Pyrex containers, (b) Pyrex trap and condenser in redistilling water and (c) the purification of molar stock solns. of each nutrient salt, by suitable modifications of Steinberg's CaCO₃ adsorption procedure. A sensitive test for heavy metals using diphenylthiocarbazone is described by which the purity of the redistilled water and nutrient salts was detd. before making nutrient solns. It was possible to prepare nutrient solns. of reproducible degree of purity, containing less than 1 part per billion of heavy metals. The methods described permit the undertaking, on a fairly large scale, of expts. to study the physiol. importance of Zn, Mn and Cu in the nutrition of higher plants, using ordinary laboratory and greenhouse facilities.—P. R. Stout.

10298. THOMAS, WALTER, and WARREN B. MACK. A foliar diagnosis study of the influence of calcium from the two sources, lime and superphosphate. Jour. Agric. Res. 58(9): 685-693. 1939.—In long-continued field expts. with Zea mays, Ca from both sources reduced the intensity of nutrition $(N+P_2O_5+K_2O)$, and also reduced the K_2O in the NPK-unit (Plant Physiology 12: 571-599. 1937) from 20 to 8. Liming resulted in a marked increase in the N of the NPK-unit and also of the P₂O₅ made at the expense of the potash. The positions of the NPK-units resulting from the different treatments, plotted in trilinear coordinates, bear a definite relationship to yields of grain.—Authors.

AUXINS, GROWTH HORMONES

10299. GOODWIN, RICHARD H. Evidence for the presence in certain ether extracts of substances partially masking the activity of auxin. Amer. Jour. Bot. 26(3): 130-135. 1939.—Determinations of the diffusion coefficient of auxin in ether extracts of corn meal and Vicia faba shoots did not agree with the theoretical diffusion coefficients for auxin a or b. The evidence suggests that this discrepancy is due to the presence in the extracts of substances which partially mask the biological effect of auxin on Avena coleoptiles. At least some of these substances are ether- and water-soluble, with mol. wts. larger than auxin. When determining the activity of unknown extracts, the possible presence of such masking substances should not be over-looked. If they are present in appreciable amounts, the actual quantity of auxin in an extract may be greater than

that detected by the Avena test.—R. H. Goodwin.

10300. GUSTAFSON, FELIX G. The cause of natural parthenocarpy. Amer. Jour. Bot. 26(3): 135-138. 1939.—Auxins (growth hormones) were extracted with ether from the ovaries of flower buds and their activity detd. by the Avena method. Parthenocarpic and non-parthenocarpic vars. of oranges, lemons and grapes were used.—The auxin conc. is considerably higher in the parthenocarpic vars. than "We can, in the corresponding non-parthenocarpic vars. therefore,—tentatively—accept the hypothesis that the reason some fruits develop without seeds is that they have a high auxin content in the ovaries at the time of blossoming and that this is high enough to set off the growth processes with the result that the ovary commences to grow even though there has been no fertilization. After growth has once commenced, it is continued either because auxin is produced in the ovary itself or because auxin is transported into it from the leaves."—F. G. Gustafson.

10301. GUSTAFSON, FELIX G. Auxin distribution in fruits and its significance in fruit development. Amer. Jour. Bot. 26(4): 189-194. 1939.—Growth hormones were extracted with ether from the fruits of pepper, tomato, cucumber, bean, crockneck summer squash, Agave brundigii, and Yucca whipplei. The hormone activity was detd. with etiolated Avena coleoptiles. In all fruits tested the ovules or seeds and the immediately surrounding tissue contained more hormone than the pericarp and when developing seeds were used alone they contained more hormone than any other part of the fruit. Parthenocarpic fruits produced by phenylacetic acid contained other growth hormone than the phenylacetic acid, indicating that in artificial parthenocarpic fruits there is naturally occurring hormone present which presumably supplements the activity of the artificially added growth substance. The significance of growth hormones in fruit development is also discussed as well as probable reasons why not all plants tried have so far been successfully caused to produce fruits parthenocarpically.-F. G. Gustafson.

10302. IRVINE, VIRGINIA C. Comparative effects on primordial tissues of X-radiation and treatment with certain growth-promoting substances. Jour. Colorado-Wyoming Acad. Sci. 2(5): 29. 1939.—Young plants of sunflower, zinnia, and tomato treated with indole-3-acetic acid, colchicine, and α- and β-naph-oxy-acetic acid showed joining of leaf primordia and disarranged phyllotaxy—effects similar to those following X-radiation.—F. Ramaley.

10303. LINDNER, ROBERT C. Effects of indoleacetic and

naphthylacetic acids on development of buds and roots in horseradish. Bot. Gaz. 100(3): 500-527. 14 fig. 1939.—
Transverse segments of the horseradish root (Cochlearia armoracia), about 4 cm. long, produce buds and roots from the sides in association with small lateral root traces. Buds are produced at the morphological top of the segment and roots at the morphological bottom—no matter what the orientation of the segment during the regeneration period. The application of 2% lanolin mixtures of indoleacetic or naphthylacetic acids to the cut surfaces, or the application of saturated aqueous solns. of these substances, inhibits the production of buds and stimulates the production of roots. The same regions are involved in bud and root formation the only difference being in the subsequent organization of the mass of meristematic tissue involved. The treatment also induced root formation from the lower cut surface of the segments not in association with lateral root traces. Naphthylacetic acid is much more effective than indoleacetic acid in inducing these responses.—R. C. Lindner.

10304. MITCHELL, JOHN W., and NEIL W. STUART. Growth and metabolism of bean cuttings subsequent to rooting with indoleacetic acid. Bot. Gaz. 100(3): 627-650. 1 fig. 1939.—Cuttings of kidney bean (Phaseolus vulgaris) seedlings were treated by immersing their bases in water, 0.002% or 0.01% indoleacetic acid for 3 hrs.; they were then set in quartz sand contained in 4-inch clay pots, which were systematically distributed on each of 2 greenhouse benches enclosed by glass to maintain high humidity. Cuttings were harvested 5 days after treatment and every 2d day thereafter until 15 days had elapsed. Each sample was divided into roots, hypocotyls, 1st internodes, primary leaves and petioles, and tips. Fresh weight, dry weight, total and insoluble N, reducing sugars, and sucrose were detd. for each sample. Treatment with 0.01% indoleacetic acid increased the weight of the hypocotyls and roots over the corresponding portions of the controls until the 13th day after treatment, and decreased the growth of the 1st internode throughout the course of the expt. and also the growth of the tips, and the difference became statistically significant on the 9th day and remained constant through the rest of the expt. Treatand remained constant through the rest of the expt. Freatment with even a strong solution (0.01%) of indoleacetic acid did not affect the dry weight of the primary leaves. Weak treatment (0.002%) caused slight growth responses that were qualitatively like the strong treatment but statistically insignificantly different from the controls. Neither the weak nor the strong treatment increased the weight of the whole plant above that of the control. During rooting N was transported from the leaves to the lst interrooting N was transported from the leaves to the 1st internodes and hypocotyls—the strong treatment being the more effective in increasing the amt, mobilized—and sub-sequently to other portions of the cuttings. In cuttings treated with 0.01% indoleacetic acid, much of this mobilized N was temporarily deposited in the hypocotyls in an insoluble form, and subsequently translocated to other por-tions of the cuttings. All of this accumulated N subse-quently disappeared; the treatment evidently stimulated the proteolytic enzymatic activity of the cuttings. Application of nutrient soln. after the cuttings were rooted increased their N content by about 35%. The larger number of roots induced as a result of treatment resulted in the uptake of only a slightly greater amt. of N and inorganic substances than were absorbed by the controls. Treatment of cuttings with 0.002% indoleacetic acid resulted in slightly greater accumulation of sugars than in the controls at the end of the expt. Treatment with 0.01% indoleacetic acid significantly reduced the sugar content of cuttings below that of controls at all times. No starch was present at any time in the roots, leaves, or tips, and only traces in the hypocotyls and 1st internodes.—Auth. summ.

10305. MOEWUS, FRANZ. Untersuchungen über die relative Sexualität von Algen. Biol. Zentralbl. 59(1/2): 40-58. 1939.—Each kind of gamete (4 of different valency in each sex) in Chlamydomonas eugametos secretes a specific substance which acts only upon gametes of the same sort. The specific effect is lost after 10 min. radiation with blue or violet light. The filtrate of each sort then becomes effective for another sort of gamete which stands next to it in valency in a definite series, extending from the strongest 2 to the strongest 3 gamete. The change from the weakest Q to the weakest & requires 30 min, radiation. A graded series of mixtures of cis- and trans-crocetindimethylester was established in which the different sorts of gametes became reactive. A radiation of 1 min. is necessary to transform 1% of cis- into trans-crocetindimethylester. The cis/ trans ratios in the mixtures agree with the times necessary to change the effectiveness of the gamete filtrates. The sex realisators determine in what mixture the cis- and trans-crocetindimethylesters are given off under the influence of light.—A. H. Hersh.

10306. NOWOSAD, F. S. Preliminary tests with some plant hormones in the rooting of cuttings of certain forage plants. Sci. Agric. [Ottawa] 19(7): 494-503. 3 pl. 1939.— Naphthyl-acetic and indolyl-acetic acids were applied to cuttings of timothy (Phleum pratense), alfalfa (Medicago media), and red clover (Trijolium pratense). None of the treatments gave satisfactory results in rooting timothy, but excellent results were obtained by treating alfalfa and red clover cuttings with naphthyl-acetic acid in any of the following ways: 50 p.p.m. in talc applied to the fresh scar of cuttings; basal ends of cuttings dipped for 12 hrs. in 5-50 p.p.m. soln., and 10 p.p.m. fed in nutrient culture soln.— F. S. Nowosad.

10307. WENT, F. W., and RALPH WHITE. Experiments on the transport of auxin. Bot. Gaz. 100(3): 465-484. 1939.— Using a new technique, the rate and capacity of indoleacetic acid transport in different tissues was investigated. The time was measured of the beginning of the growth curvature in Avena coleoptiles, comparing (a) the unilateral application of an agar block containing indoleacetic acid and (b) the same with the interposition of a piece of tissue through which the indoleacetic acid had to move before it reached the Avena test plant. The difference between both values gave the transport time. In general the results of van der Weij were confirmed. However, the polarity of indoleacetic acid transport in the Avena coleoptile is much more pronounced than the earlier investigators found. At high humidities auxin leaks along the surface which can be prevented by low humidity (below 75%) or application in lanoline. The rates of transport through coleoptile cells were highest for indoleacetic acid (9 mm/hour) and decreased for indole butyricacid (6.5 mm/hr.) anthraceneacetic acid (5.5), naphthaleneacetic acid (4) and cis-cinnamic acid (<3), in the same order as their activity in the Avena test decreases. Transport through other tissues was also measured.—F. W. Went.

PROTOPLASM

10308. NORTHEN, HENRY T. Studies of protoplasmic structure in Spirogyra. IV. Effects of temperature on protoplasmic elasticity. Bot. Gaz. 100(3): 619-626. 1939.— Groups of Spirogyra filaments were maintained at temps. from 1° to 43°C for varying periods of time, and were then centrifuged at these temps. As the temp. was raised from 1° to 38° the elasticity of the protoplasm was decreased, as evidenced by a lowering of the minimum centrifugal acceleration necessary to move the chloroplasts. At 43° C there was coagulation of the protoplasm preceded by a decrease in elasticity. The data suggest that protoplasm has a netlike structure formed of combinations of long protein molecules with lipoid molecules. Each increase in temp. may liberate some of the molecules from the network or alter the shape of the protein molecules, thus decreasing the protoplasmic elasticity. Presumably at 43°C the liberated lipoid molecules fuse to form droplets, and the protein molecules, no longer separated in the network, fuse to form a coagulum.—H. T. Northen.

OSMOSIS, PERMEABILITY

10309. JACQUES, A. G. The kinetics of penetration. XVI. The accumulation of ammonia in light and darkness. Jour. Gen. Physiol. 22(4): 501-519. 4 fig. 1939.—The accumulation of ammonia in Valonia macrophysa takes place more rapidly in light than in darkness. It appears to go on until a steady state is attained. The steady state conc. of ammonia in the sap is about twice as great in light as in darkness. Both effects are possibly due to the fact that the external pH (and hence the conc. of undissociated ammonia) outside is raised by photosynthesis. Certain "permeability constants" have been calculated. These in-

dicate that the rate is proportional to the conc. gradient across the protoplasm of NH₄X which is formed by the interaction of NH₅ or NH₆OH and HX, an acid elaborated in the protoplasm. The results are interpreted to mean that HX is produced only at the sap-protoplasm interface, and that on the average its conc. there is about 7 times as great as at the sea-water protoplasm interface. This ratio of HX at the 2 surfaces also explains why the conc. of undissociated ammonia in the steady state is about 7 times as great in the sea-water as in the sap. The permeability constant P'' appears to be greater in the dark. The pH of sap has been detd. by a new method which avoids the loss of gas (CO₂), an important source of error. The results indicate that the pH rises during accumulation but the extent of this rise is smaller than has hitherto been supposed. As in previous expts., the entering ammonia displaced a practically equivalent amt. of K from the sap and the Na conc. remained fairly constant. It seems probable that the pH increase is due to the entrance of small amts. of NH₃ or NH₄OH in excess of the K lost as a base.—Auth. summ.

excess of the K lost as a base.—Auth. summ.

10310. JACQUES, A. G. The kinetics of penetration.

XVII. The exit of ammonia in light and darkness. Jour.

Gen. Physiol. 22(4): 521-543. 2 fig. 1939.—The exit of accumulated ammonia from the sap of Valonia macrophysa into normal (nearly ammonia-free) sea water was studied in light (alternation of daylight and darkness) and in darkness. Exit is always preceded by an induction period lasting 1 or more days. This is longer in darkness. After exit starts the rate is greater in light than in darkness. The pH of the sap drops off soon after the cells are exposed to normal sea water even before any definite decrease in the ammonia conc. of the sap has occurred. This suggests that the decrease in the pH is due to the loss of a small amt. of NH₃ or NH₄OH without a corresponding gain of Na as a base. In most cases Na replaced the ammonia lost during exit, but there is some evidence that K may also replace ammonia. To account for the induction period it is suggested that other substances than NH₄X are concerned in the transport of ammonia, for example urea or amino acids.—

Auth. summ.

10311. OSTERHOUT, W. J. V. Changes of apparent ionic mobilities in protoplasm. IV. Influence of guaiacol on the effects of sodium and potassium in Nitella. Jour. Gen. Physiol. 22(3): 417-427. 6 fig. 1939.—In Nitella, as in Halicystis, guaiacol increases the mobility of Na⁺ in the outer protoplasmic surface but leaves the mobility of K⁺ unaffected. This differs from the situation in Valonia where the mobility of Na⁺ is increased and that of K⁺ is decreased. The partition coefficient of Na⁺ in the outer protoplasmic surface is increased and that of K⁺ left unchanged. Recovery after the action current is delayed in the presence of guaiacol and the action curves are "square topped."—Auth. summ.

GERMINATION, DORMANCY

10312. BURTON, GLENN W. Scarification studies on southern grass seeds. Jour. Amer. Soc. Agron. 31(3): 179-187. 1 fig. 1939.—All germination tests were made by planting 100 florets containing caryopses in duplicate or triplicate in flats of steam-sterilized soil in the greenhouse. Seedling counts, usually made at weekly intervals, demonstrated the effect of seed treatment on germination rate. Dry heat (70°C for 4 hrs.), soaking in water 24 hrs. with and without reduced pressure, and treatment with cone. HCl for 5 min. did not increase the germination of Bahia grass (Paspalum notatum) seed significantly. Removing the palea, treating the seed in conc. technical H₂SO₄ for 5 min. and removing all glumes from the caryopses by rubbing the seeds between sandpaper blocks hastened germination materially. Bahia seed treated 10 min. in conc. H₂SO₄ germinated 52% in 8 days while untreated seed germinated 0.3% in 3 weeks. Scarification of Bahia seed with crude H₂SO₄ (used in making superphosphate) for 45-60 min. proved about as effective as a 10-min. scarification in conc. H2SO4. Since crude H2SO4 is much cheaper than technical acid, and since there is less danger of killing the seed from overtreatment, its use is recommended. Bahia grass seed, unlike many grasses, seems to require no period. Scarifying Dallis grass, P. dilatatum, seed with conc. technical H₂SO₄ for 5 min, hastened germination materially. The value of 35% NaOH as a mild scarifying agent was

demonstrated. 5- and 10-min. treatments with either 50% HCl or 35% NaOH increased the germination rate of centipede grass (*Eremochloa ophiuroides*) seed. Treating unhulled Bermuda grass, *Cynodon daetylon*, seed with conc. HCl for 5 min. hastened its germination. Seed of Vasey grass, *P. urvillei*, and carpet grass, *Axonopus affinis*, germinated readily without treatment and all scarification treatments reduced the viability of the seed of these species.— *G. W. Burton*.

10313. GANE, R., and A. J. M. SMITH. Water relations of seeds. [Gr. Brit.] Dept. Sci. and Indust. Res. Ann. Rept. Food Invest. Bd. 1937: 214-222. 3 fig. 1938.—The uptake of water-vapor and water by air-dried seeds including soy-beans, dried peas, wheat and rice is shown graphically. The rate of drying of peas by CaCl₂ in (1) N₂ and (2) air is similar and greater than that of peas in air at 0.7% humidity; the amt. of water absorbed by partially dried peas decreases as the samples are dried, irrespective of method of drying or degree of maturity. Peas dried on the vine lose some of their power to absorb water after drying in air over CaCl₂. Color changes, cooking tests and changes in sugar content during drying are also given.—Authors.

GROWTH, DEVELOPMENT

10314. HAMMETT, FREDERICK S. A correlation between sulfhydryl, mitosis, and cell growth in length in roots of Phaseolus vulgaris. Growth 2(4): 297-302. 1938.—Quantitative analysis for SH of root sections of sprouting beans established a positive correlation between proliferation activity and SH conc. and a negative correlation between SH conc. and root growth by cell elongation. The order of increasing SH amount is mid-section, contiguous meristem, terminal meristem. This is consistent with the postulate that SH is specifically associated with cell increase in number as distinct from cell increase in size.—F. S. Hammett.

10315. PIRSCHLE, KARL. Über den Mineralstoffwechsel von homo- und heteroplastischen Pfropfungen mit Petunia D und d. Biol. Zentralbl. 59(3/4): 123-157. 1939.—Data are given for the fresh weight, dry wt., water content, leaf size, leaf number, total ash, and the content of the ash in K, Ca, Mg, P, Fe, Mn, Si and N for the intact normal (DD) and a chlorophyll defective mutant (dd) and for the homo- and heteroplastic graft combinations DD/DD, DD/dd, dd/DD, and dd/dd. The rôle of the leaves and stems in their separate contribution to the above characteristics is also detd. In most cases the dd-stock has an inhibiting influence on the DD-scion, and the DD-stock a greater enhancing effect on the dd-scion. In regard to Fe and Si the dd-stock has an enhancing effect, the DD-stock an inhibiting effect on the scion. The ash content follows the above rule but the composition of the ash shows in general that the influence of the stock on the scion is small in comparison to the genetic tendency of the scion itself.—A. H. Hersh.

genetic tendency of the scion itself.—A. H. Hersh.

10316. ROBBINS, WILLIAM J., and MARY BARTLEY SCHMIDT. Further experiments on excised tomato roots. Amer. Jour. Bot. 26(3): 149-159. 6 fig. 1939.—Light brown sugar was better for the growth of excised tomato roots than pure cane sugar in a soln. containing sugar, minerals and thiamin. Growth decreased as the proportion of light brown sugar in the soln. was reduced. The ash of the brown sugar was not responsible for the benefit observed. Nicotinic acid, nicotinamide, and amino acids were not beneficial when added to a soln. of pure sugar, minerals and thiamin, but addition of crystalline vitamin B_6 was quite beneficial. Vitamin B_6 increased growth when added to solns. of sugar, minerals and thiamin in which the proportion of brown sugar was reduced. Observations are reported on hooks and curls which developed in the tips of roots grown in solutions containing vit. B_6 . Evidence for unknown growth substances important in the growth of tomato roots is presented.—W. J. Robbins.

PHOTOPERIODISM

10317. NEIDLE, EDITH K. Nitrogen nutrition in relation to photoperiodism in Xanthium pennsylvanicum. Bot. Gaz. 100(3): 607-618. 1939.—Plants on a short photoperiod bloom first, bearing more staminate and pistillate flowers and fruits but showing higher sterility than if grown under a long photoperiod. The N supply if abundant under a short photoperiod tends to produce higher sterility than if

it is low. The opposite effect is found under a long photoperiod.—E. K. Neidle.

10318. PARKER, M. W., and H. A. BORTHWICK. Effect of photoperiod on development and metabolism of the Biloxi soy bean. Bot. Gaz. 100(3): 651-689. 1939.—Biloxi soy bean plants with flower primordia initiated upon them were transferred to photoperiods of 8, 10, 12, 13, 14, 15, 16, and 18 hrs. and the development of these primordia and the flowering and fruiting responses of the plants were detd. The plants transferred to photoperiods of 8 to 13 hrs. bloomed nearly simultaneously and all produced fruits, but the yield of fruits on the 8-hr. lot was somewhat less than on the 10-, 12-, and 13-hr. lots. Flowering on the 14- and 15-hr. plants was later than on those of shorter photoperiod, the flowers were less numerous, and no fruits were formed. No flowers opened on the 16- and 18-hr. plants. The longest photoperiod on which fruit formation occurred was 13 hrs. and the shortest one on which no flowering took place was 16 hrs. Plants were grown for biochemical studies on 8-, 13-, and 16-hr. photoperiods after initiation of flower primordia. A control lot was grown continuously on 16-hr. photoperiods. The carbohydrate and N metabolism of these plants was detd. at frequent intervals throughout the season. At the end of the week's induction period the total N and soluble non-protein N were higher in the plants receiving 8-hr. photoperiods than in the controls. Carbohydrates were lower than in the controls, with the exception of starch in the leaves, which was higher. The total N in both leaves and stems of the 16-hr. transfers became similar to that of the controls and the 13-hr. transfers approached the 8-hr. ones as the season advanced. The soluble non-protein N showed the same relationship in the There was an abrupt rise in the amt. of ammonia in the leaves and stems of the 8- and 13-hr. transfer plants when pods were just beginning to form. The amt. of soluble earbohydrates in the transfer groups seems to be correlated with the length of photoperiod. Starch accumulated in the leaves and stems of the 8- and 13-hr. transfers when pods were beginning to form. 2 groups of plants with flower buds initiated upon them and subsequently grown at photoperiods just above and just below the critical showed progressive deviation from each other in their carbohydrate and N metabolism. Those grown below the critical became similar to plants grown on 8-hr. photoperiod; those above the critical became similar to plants that had been kept vegetative by growing them continuously on 16-hr. photoperiod.— From auth. summ.

TRANSPIRATION, TRANSLOCATION

10319. ENGARD, CHARLES J. Translocation of carbohydrates in the Cuthbert raspberry. Bot. Gaz. 100(3): 439-464. 1939.—Seasonal fluctuations in reducing sugars, sucrose, starch, acid hydrolyzable carbohydrates, total carbohydrates and the residual polysaccharides are recorded. Only the 1styear or vegetative canes were used. Ringing was used to check movements of sugars. Double rings were used, one 15 cm. and another 30 cm. above the ground. Plants were ringed and others tagged for controls on May 15, again on June 23, and finally on July 16. The plants treated on May 15 were harvested on June 23; those treated on June 23 and July 16 were harvested on July 16 and Aug. 9 respectively. Total carbohydrates accumulated above the rings and decreased between and below the rings. Sucrose, although low in conc., made the largest increases above and below the rings, in percentage of the normal concs., of all fractions. It decreased between the rings from 75 to 100%. Reducing sugars increased above the rings, but in percentage of the normal, only half that of sucrose. They decreased between and below the rings. All carbohydrate gradients were positive, sugars moving downward with a positive gradient. The gradients of acid hydrolyzable substances and starch were static. Ringing increased the positive gradient of reducing sugars. The slight gradient of sucrose was increased; if this sugar were moving only downward, a decrease in gradient would be expected. This effect, coupled with the great accumulation above and below the rings, suggests that in the early development of the young shoot there is a movement of sucrose from the perennial, carbohydrate-gorged roots into the young cane; during the growth period of the 1st season the roots-to-shoot gradient gradually disappears owing to the increased production of sugars by the rapidly enlarging foliage region of the cane; there is a counterbalancing of the upward movement from the roots by a downward movement of sucrose from the foliage; and the effect of the rings is to remove the influence of the opposing source in each case. The residual substances consist of those polysaccharides, small quantities of fats, minerals, and organic N which remain after the total carbohydrates, including acid hydrolyzable substances, are subtracted from the dry weight. The residual polysaccharides fluctuate as the total carbohydrates, particularly reducing sugars and the hemicelluloses fluctuate, and in the same direction.—C. J. Engard.

RADIATION EFFECTS

10320. FLINT, LEWIS H., and CHARLES F. MORELAND. Response of lettuce seedlings to 7600Å radiation. Amer. Jour. Bot. 26(4): 231-233. 1 fig. 1939.—Expts. are descr. in which the emergent beam from a reflecting monochromator (using a Mazda S-type lamp as a light source) was directed upon lettuce seedlings in a dark chamber, the seedlings outside the beam serving as controls. The λ ranges and the intensities of the radiations were indicated. Exposures at horizontal incidence gave results which indicated no phototropic response to 7600Å radiation. Exposures at vertical incidence gave results which indicated no phototropic response to 7600Å radiation. Exposures at vertical incidence gave results indicating a stunting effect of 7600Å radiation. The stunting effect appeared to be fairly well restricted to the 7600Å region and did not involve CO₂ assimilation or temp. differences.—L. H. Flint.

10321. HARTER, L. L. The influence of light on the length of the conidia in certain species of Fusarium. Amer. Jour. Bot. 25(4): 234-243. 1939.—The conidia of Fusarium coeruleum, F. martii var. pisi and F. bulbigenum var. batatas, grown on different culture media exposed to sunlight and artificial irradiation, were considerably longer than when the cultures were kept in the dark. If the cultures were exposed to light the first 4 days after inoculation and then kept in the dark, normal spore production resulted; if the cultures were kept in the dark for the first 4 days and thereafter exposed to the light, normal spores were not produced. The maximum number and size of macroconidia occurred in the light; microconidia predominated in the dark. Statistically significant differences occurred when different investigators measured conidia from the same microscopic preparation.—L. L. Harter.

RESPIRATION

10322. BARKER, J. Changes of sugar content and respiration in potatoes stored at different temperatures. The sugar content of potatoes. [Gr. Brit.] Dept. Sci. and Indust.* Res. Ann. Rept. Food Invest. Bd. 1937: 175-179.2 fig. 1938.—Changes in the sugar and respiration in potatoes stored at 15°, 10°, 7.5° and 5°C are shown graphically. For commercial purposes, e.g., manufacture of crisps, potatoes to be used in autumn or early winter should be stored at 15°C to induce a fall in sugar content; for more prolonged storage a temp. of 10° or 7.5° is more satisfactory. The sugar content of potatoes varies markedly according to var. and locality. Below 1.1% the sugar content is not correlated with culinary quality; above this value quality for steaming or frying is impaired—I. Racker

or frying is impaired.—J. Barker.

10323. FIDLER, J. C. The rôle of acetaldehyde in the catabolism of carbohydrate. [Gr. Brit.] Dept. Sci. and Indust. Res. Ann. Rept. Food Invest. Bd. 1937: 124-123. I fig. 1938.—Treatment of apples with acetaldehyde vapor caused a sharp rise in the rate of production of CO₂ and in the R. Q. but effected no change in the rate of uptake of O₂. In a similar expt. with Valencia oranges, introduction of acetaldehyde resulted in a pronounced and prolonged stimulation of CO₂-production and uptake of O₂. Values for the basal R. Q. in both cases were similar to those in air.—J. C. Fidler.

10324. JAMES, W. O., and I. P. NORVAL. The respiratory decomposition of pyruvic acid by barley. New Phytol. 37(5): 455-473. 9 fig. 1938.—Young barley tissues killed by drying, mechanical crushing or treatment with acetone will break down pyruvic acid with formation of CO₂ and

acetaldehyde. The activity is due to a carboxylase, which is destroyed by heat, rapidly inactivated in the presence of water, and liable to the action of a partial inhibitor present in some preparations. The carboxylase remains active in the presence of O₂. Germinating embryos and young detached leaves increase their rate of CO₂ emission when supplied with M/20 pyruvic acid; their R.Q. rises but does not reach 1.2. O₂ absorption may be depressed, due apparently to inactivation of a dehydrogenase by excess pyruvate. It is shown, by careful application of the iodoform and nitroprusside tests, that the pyruvic acid is both absorbed and broken down. Pyruvic acid is likely to be a normal intermediary in barley respiration.—W. O. James.

10325. KIDD, F., and C. WEST. The action of CO2 on the respiratory activity of apples. The uptake of O2 by apples. The effect of ethylene on the respiratory activity and the climacteric of apples. Individual variation in apples. [Gr. Brit.] Dept. Sci. and Indust. Res. Ann. Rept. Food Invest. Bd. 1937: 101-115. 11 fig. 1938.—Expts. on Bramley's Seedling apples stored at 50°F in "gas" (10% CO2, 20% O2) show that the immediate but transitory effect of CO2 is to increase the respiratory activity. The more immature the fruit, up to a point, the greater the effect. The O2 uptake of mature Bramley's Seedling apples at 72.5°F follows the same trend as the production of CO2. Losses in carbohydrate, dry weight and acid are not accounted for by simple oxidation. With immature apples, the uptake of O2 meets the requirements of oxidation of acid and carbohydrate loss, while the loss of carbohydrate but not loss of acid increases at the climacteric. Sturmer Pippin apples exposed to ethylene for 1 to 5 hrs. exhibit stimulation with recovery; those treated for 1 and 2 days exhibit stimulation without recovery. Apples transferred to low temps. at different stages of respiratory activity and stimulated by ethylene at 1°C show a rise in resp. activity. In the presence of 10% CO2 up to 2 days' exposure to ethylene produces stimulation followed by recovery. After one or more recoveries further stimulation is not followed by recovery. This recovery from stimulation by ethylene and the indication that the effect of successive doses is additive have not previously been reported. The climacteric rise in apples remaining attached to the tree occurs normally and shows extensive scattering as regards time of onset.—Authors.

10326. KIDD, F. The internal atmosphere of potatoes. [Gr. Brit.] Dept. Sci. and Indust. Res. Ann. Rept. Food Invest. Bd. 1937: 179-184. 2 fig. 1938.—Cylindrical plugs cut from the centers of potato tubers were pumped out under a vacuum and the amt. of CO₂ escaping detd. The effect of various factors including temp., peeling and drying, cooling, sprouting and size was investigated. The ratio of "bound CO₂" to dissolved CO₂ fell with rise in pressure of CO₂ and rise in temp.—F. Kidd.

10327. NELSON, R. C. Studies on production of ethylene in the ripening process in apple and banana. Food Res. 4(2): 173-190. 6 fig. 1939.—The microchemical method for the detn. of ethylene in plant tissues described consists in absorbing by sodamide, interfering alcohols, esters, etc., from a gas sample extracted from tissue by boiling and vacuum, reacting the ethylene with KMnO₄ and back titrating. There is a general correspondence between the course of respiratory activity and that of ethylene content in ripening apples and bananas. Vars. of apples having longer storage lives are characterized by lesser abilities to produce ethylene. Ethylene or a gas of similarly high physiol. activity is produced by bananas during ripening and is partly consumed during the period of intensive ripening. Ethylene in ripening accelerates hydrolytic processes, but this is not a simple effect on hydrolytic enzymes.—R. B.

10328. POSTMA, W. P. Einige Bemerkungen über den Einfluss der Nitratreduktion auf die Atmung der Wurzeln. $K.\ Akad.\ Wetenschap.\ Amsterdam.\ Proc.\ Sect.\ Sci.\ 42(2):$ 181-186. 1939.—Oat plants were cultivated in the light for 13 days on a Knop medium lacking N, followed by 2 days in darkness. After this period the stem and leaves were removed and the roots placed in aerated solns. of nitrate, or of glucose, or of both, for 2 days. If carbohydrate was present nitrate was taken up and reduced and protein synthesis took place. Respiration (evolution of CO_2) in solns.

with nitrate but without glucose and also in solns, without nitrate but with glucose was about 1½ times that in solns, without either nitrate or glucose. If both nitrate and glucose were present the respiration was about 10 times as high.—J. van Overbeek.

CARBOHYDRATE METABOLISM

10329. FREUDENBERG, KARL, und ERWIN PLANKEN-HORN. Synthese der 2,4,6 Trimethylglucose und ihre Beziehung zum Hefeglukan. Justus Liebigs Ann. Chem. 536 (3): 257-266. 1938.—From the cell wall of yeast a polysaccharide of glucose can be separated that yields after methylation and hydrolysis a trimethyl-glucose. Synthesis: 3-benzyl-glucose is changed over the acetate into 2,4,6-trimethyl-3-benzyl-a,8-methylglucoside. The benzyl group is split off with Na and alcohol; from the mixture of the a and β methylglucosides of the 2,4,6-trimethyl-glucose the 2,4,6-trimethyl- β -methylglucoside and through saponification the 2,4,6-trimethyl-glucose may be separated.—M. Neuhof.

NITROGEN METABOLISM

10330. HULME, A. C. The metabolism of nitrogen in apple-fruits. [Gr. Brit.] Dept. Sci. and Indust. Res. Ann. Rept. Food Invest. Bd. 1937: 117-121. 1938.—The alcoholsoluble fractions of apple pulp were examined for (1) humin N, (2) total basic N, (3) monamino acid- plus imino- plus "rest". N and (4) monamino acid N. The amt. of the basic amino acids was very small and the amt. of "free" amide N relatively large. Aqueous extracts of the pulp were treated with various precipitants to ascertain whether any intermediate N compounds between proteins and amino acids were present. Large amts. of proteoses and polypeptides were not found. Liquid separated by the centrifuge from a conc. extract of immature Bramley's Seedlings gave the following analysis: total N 950 mg., ammonia N 18 mg., amide N 326 mg., amino N 416 mg., "rest" N 190 mg.—A. C. Hulme.

10331. KURSANOV, A., i K. BRIŪSHKOVA. Sintezirufishchee deĭstvie proteaz v zhivykh tkanākh vysshikh rastenii. [The synthesizing action of proteases in the living tissues of higher plants.] [In Russ. with Eng. summ.] Biokhimiā 3(5): 569-582. 1938.—Amino acid mixtures obtained by hydrolysis of albumin or legumin were introduced into sprouts and leaves by vacuum infiltration and the quantity of protein synthesized was detd. In peas this was equivalent to 52 mg. N per hr. per g. of the dry wt. of the plant. Synthesis is most active during the first 15-30 min. and the rate is the same in air or in atmosphere of N. In young sprouts activity varies with age. Products of synthesis are mostly proteins, very few peptones. The authors suggest that in vegetative organs the synthesizing action is greater than the hydrolyzing action; that proteases, like other enzymes, act in the direction of synthesis when in adsorbed state, in direction of hydrolysis when in soln.—

E. K. Johnson.

PIGMENTS

10332. BLACKIE, WILLIAM JOHN, and GEORGE R. COWGILL. Occurrence of carotene in the oil of Attalea gomphococca Mart. and its relation to vitamin A potency. Food Res. 4(2): 129-133. 1939.—Chemical, physical and feeding expts. showed the presence of carotenes in the cortex oils of 2 vars. of the nuts of A. gomphococca, a palm occurring in Panama. By feeding expts. the vit. A potencies proved to be about 158 I.U. per g. for the cortex oil of the "Corrozo Negro" var., and about 48 I.U. per g. for the "Corrozo Gallinazo" sample. These vit. A values, detd. biologically, are well below those recorded by Rosedale (1935) for the oil of Elaeis guineensis.—G. R. Cowgill.

ENZYMES

10333. HANES, C. S. Studies of the action of amylases. [Gr. Brit.] Dept. Sci. and Indust. Res. Ann. Rept. Food Invest. Bd. 1937: 115-117. 1 fig. 1938.—By treatments with dilute iodine the saccharogenic (or β) enzyme present in aqueous extracts of ungerminated barley and wheat is destroyed and a thermolabile catalyst, which may be described as a disaggregating amylase, left in the active state. Treatment of starch paste with the above prepn. results in a progressive decrease in viscosity, the disaggregated product

containing 70 to 80% of the total original P. Further expts, on the saccharogenic amylase of barley support the hypothesis that under action of the enzyme the chain molecule of starch is degraded from one end as a result of the cleavage of successive terminal disaccharide fragments. Preliminary observations on the amylase of banana indicate that this enzyme is closely similar to the acomponent of malt amylase. The relation between iodine coloration and reducing power during amylolysis provides a highly diagnostic criterion for the action of starch-splitting enzymes.—C. S. Hanes.

10334. MOOI, J. C. Über die Enzyme, die bei der Verwandlung von Alanin und von Asparaginsäure durch Aspergillus niger beteiligt sind. K. Akad. Wetenschap. Amsterdam. Proc. Sect. Sci. 42(2): 195-200. 1939.—An increase of the alanin conc. over 0.4 M does not further increase the NH, output. It is assumed that the enzyme for the deamination of alanin is used to its maximum extent. If to the 0.4 M alanin was added 0.08 M aspartic acid, the NH, output increased 25% over the value reached with a maximum conc. of alanin alone. This suggests that one specific enzyme is necessary for the deamination of alanin and a different one for aspartic acid.—J. van Overbeek.

10335. ZEYLEMAKER, F. C. J. Karboxylase und Kokarboxylase beim Keimen von Avena. K. Akad. Wetenschap. Amsterdam. Proc. Sect. Sci. 42(2): 187-194. 1939.— Carboxylase is composed of cocarboxylase (vitamin Badiphosphoric acid) and "protein." It decomposes pyruvic acid into CO₂ and formaldehyde. In ground plant material in a N₂ atmosphere the amt. of CO₂ evolved (anaerobic fermentation) is a measure for the carboxylase activity. In ground leaves or roots of germinating Avena seedlings (3-12 days) the anaerobic fermentation is limited by pyruvic acid and also to some extent by cocarboxylase (addition of either gives an increase). The cocarboxylase content remains constant during germination. If both pyruvic acid and cocarboxylase are added in excess to the ground Avena tissue the activity is limited by the "protein." During the first 3 days of germination the "protein." content increases; during the following 9 days it decreases.—J. van Overbeek.

TOXICITY

10336. CRAFTS, A. S. The relation of nutrients to toxicity of arsenic, borax, and chlorate in soils. Jour. Agric. Res. 58(9): 637-671. 4 fig. 1939.—Response to herbicides that act through the soil is largely controlled by such factors as fertility and textural grade of the soil. Expts. show that As and B toxicity are correlated with texture while chlorate toxicity depends upon fertility. Raising the nutrient level decreased chlorate toxicity but did not affect As and B toxicity. In single-salt soil-culture series with varying chlorate cones., those with added nitrate invariably showed lowered chlorate toxicity. In fertile soil cultures chlorides and sulfates also reduced toxicity. Cations had no effect upon chlorate toxicity except where ammonium ions were rapidly nitrified. Results of soil-culture tests were substantiated with water-culture expts. Absorption expts. in water cultures indicate that little chlorate is taken up from high nitrate cultures but plants will absorb chlorate and concentrate it in the xylem sap from low nitrate cultures.—A. S. Crafts.

10337. JONES, C. R. The effects of HCN gas, methyl bromide and methyl bromide and carbon dioxide on tomato fruits and greenhouse plants. Jour. Colorado-Wyoming Acad. Sci. 2(5): 39. 1939.—Tomato fruits and greenhouse plants fumigated with HCN showed injury from large doses, and cyanogen was deposited in the tomato fruits; the other fumigants used did no injury, even with long exposures.— F. Ramaley.

APPARATUS, METHODS

10338. COLEMAN, O. H., and ROBERT GARDNER. Comparison of methods of determining small quantities of HCN. Soil Sci. 47(5): 409-413. 1939.—The modified alkaline method of determining HCN gave more reliable results for Sudan grass and pure chemicals over the range of concs, used than the colorimetric methods when the total distillate was titrated. Tin condensers and autolysis in an Erlenmeyer

with the resultant transfer of plant material to a Kjeldahl flask gave good results.—O. H. Coleman.

STOMATA

10339. HEATH, O. V. S. An experimental investigation of the mechanism of stomatal movement, with some preliminary observations upon the response of the guard cells to "shock." New Phytol. 37(5): 385-395. 1 pl. 1938.—Expts. were carried out to determine whether stomatal movement was due entirely to turgor changes, or whether imbibitional changes in a 2-layered wall were concerned. The method consisted in puncturing guard cells and subsidiary cells of Cyclamen persicum and Tradescantia zebrina under microscopic observation. In both spp. movements of guard cells demonstrated hydrostatic pressure on the dorsal wall, and the collaboration of a wall mechanism in stomatal movement was disproved, except possibly in the initial phase before any aperture appeared ("Spannungsphase," Stälfelt). The guard cells of Cyclamen appeared to show no response to "shock" or wound stimuli. In the stoma of Tradescantia, closure occurred in response to the puncturing of one guard cell or of any one of the 4 cells which together with the stoma form a unit.—O. V. S. Heath.

PLANT CONSTITUENTS

10340. HENRY, THOMAS ANDERSON. The plant alkaloids. 3rd ed. viii +689p. P. Blakiston's Son and Co.: Philadelphia, 1939. Pr. \$12.—This third edition has been rewritten entirely and considerably enlarged because of the new material made available by increased investigation in recent years. The subject matter is arranged primarily on the basis of chemical classification but modified by biological considerations whenever necessary with cross references

as for example in the case of the apomorphines. The alkaloids are arranged in the pyridine, tropane, lupinane, isoquinoline, phenanthridine, quinoline, indole, pyrrolidine, quinazoline, and glyoxaline groups, the alkaloidal amines, alkaloids of undetermined constitution, and the minor alkaloids. In addition to the chemical and constitutional formulae for each alkaloid, the botanical derivation, chemical preparation, pharmaceutical history and uses, and physiological action are given. Citations of pertinent literature are appended to the discussion of each alkaloid. There is an extended discussion of cinchona alkaloids and a brief history of their introduction and their later developments is included. Extensive treatment is also given to the curare and opium alkaloids.—C. A. Kofoid.

MISCELLANEOUS

10341. LOOMIS, W. E., and C. A. SHULL. Experiments in plant physiology. A laboratory textbook. xiv + 213p. 52 fig. McGraw-Hill Book Co., Inc.: New York, 1939. Pr. \$2.—This is a revision of the first part of the authors' Methods in plant physiology, in which the laboratory expts. have been simplified and recently developed ones on plant hormones have been added. It is planned for elementary and intermediate courses in plant physiology with more expts. included than can be utilized in the usual course, the more complicated ones being indicated for group exercises or class demonstrations. Simple apparatus is utilized and quantitative methods stressed. References and citations of original papers are added. The subjects covered are water relations, transpiration, plant nutrients, rôle of diffusion, colloidal phenomena, photosynthesis, pigments, foods, respiration, enzymes, growth and movement, growth-differentiation balance, and growth correlation.—C. A. Kofoid.

PHYTOPATHOLOGY

FREEMAN WEISS, Editor

(See also in this issue Entries 8896, 8899, 8934, 9979, 10221, 10226, 10230, 10231, 10232, 10275, 10297, 10321, 10337, 10460, 10471, 10472, 10475)

DISEASES CAUSED BY FUNGI

10342. DRECHSLER, CHARLES. Several species of Pythium causing blossom-end rot of watermelons. Phytopath. 29(5): 391-422. 14 fig. 1939.—Decay of watermelons caused by one or another of 9 known spp. of Pythium is widely distributed in the U.S. In regions where the crop grows and matures under moderately dry conditions, the losses are usually insignificant; substantial losses occur in some parts of the Middle Atlantic States, where during wet seasons a late crop is exposed to more abundant infection. For control of the decay under such severe circumstances, application of a suitable adhesive fungicidal paste to the flower scar is suggested. Normally the fungi concerned gain entrance into uninjured fruit at the flower scar; their advance thereupon through the massive berry being manifested externally either in a watersoaked appearance or in dark brown discoloration, depending largely on the identity of the parasite concerned. Illustrated descriptive accounts of 3 spp. producing dark brown blossom-end rot, P. acanthicum, P. periplocum and P. helicoides are given to supplement the diagnoses previously published; also a discussion of the morphology of P. helicoides entailing comparison especially with P. proliferum and the recognition accorded the latter species by various writers. Similar treatment is devoted also to P. anandrum, one of many species capable of causing decay when inoculated artificially into watermelons, but not known to occur spontaneously on fruits in the field. The morphological parallelism of P. anandrum with P. megalacanthum is given some attention.— C. Drechsler.

10343. HEWITT, WM. B., and L. D. LEACH. Brown-rot Sclerotinias occurring in California and their distribution on stone fruits. *Phytopath.* 29(4): 337-351. 4 fig. 1939.—In California, brown rot of stone fruits has been recognized primarily as a serious blossom- and twig-blighting disease of apricots, almonds, cherries, and prunes, but within the past few years brown rot of peach fruits has become a

major problem. Apothecia of Sclerotinia fructicola (Wint.) Rehm. were found March 3, 1936, apparently for the first time in California. A comparison of cultures from apothecia with those from blighted apricot twigs showed the latter to be S. laxa. Evidence is presented that S. laxa has been present in California for a long time; that it is probably the species most commonly referred to in the earlier publications; and that S. fructicola may have been introduced recently. A survey showed that S. laxa occurs in all of the fruit-producing sections of the state and has been most commonly associated with blossom and twig blighting; whereas S. fructicola is more localized, occurring most abundantly in the peach-producing districts of the interior valleys, and has been isolated most frequently from rotting fruits. In no instance has S. fructicola been isolated from overwintering blighted twigs of stone fruits which were producing sporodochia. Only S. laxa has been isolated from blighted flowers and twigs of almonds.—Authors.

10344. JOHNSTON, C. O., and C. L. LEFEBVRE. A chlorotic mottling of wheat leaves caused by infections of bunt Tilletia laevis. Phytopath. 29(5): 456-458. I fig. 1939.— In greenhouse expts. it was noted that wheat plants infected, with bunt almost invariably exhibited a yellowish mottling of the leaves, while noninfected plants remained a normal green. The mottling was so constant and distinct that infected plants could be identified long before heading. Mottling was observed in vars. of both spring and winter wheat. Owing to complicating factors, the presence of mottling in the field proved not to be as certain an indication of bunt infection as it was in the greenhouse.—C. O. Johnston.

10345. LEFEBVRE, C. L. Ergot of Paspalum. Phytopath. 29(4): 365-367. 1939.—The following are apparently new hosts of Claviceps paspali: Paspalum urvillei, P. longipilum, P. pubescens, P. pubiforum, P. ciliatifolium, P. langei, and P. intermedium. The following spp. were repeatedly inoculated in the field, but no infection resulted: P. notatum

(narrow leaf type from Georgia), *P. lividum*, *P. notatum* (common local type from Georgia), *P. malacophyllum* (a strain from Tifton, Georgia, and one from Gainesville, Florida) and *P. supinum*.—*C. L. Lefebure*.

10346. McCORMICK, FLORENCE A. "Cephalosporium die-back" of elms. Phytopath. 29(4): 371-372. 1939.—The author reports 2 elm trees in New Haven, Connecticut, which are infected with Dothiorella ulmi ("Cephalosporium" sp.) and which have been under observation for 11 yrs. During this period repeated cultures have produced the same fungus although the trees are in as good condition now as when they were first observed.—F. A. McCormick.

10347. MATTHEWS, E. D., C. A. RENEGER, and R. P. THOMAS. Soil studies on the causes of the brown root rot of tobacco. Jour. Agric. Res. 58(9): 673-684. 1939.—Chem. and biol. factors were studied in soils in which the brown root rot of tobacco occurred. No direct association between these factors and the disease was found. Sclerotium bataticola was isolated from many of the brown roots. The culture habits of this organism were studied under laboratory conditions. These culture characteristics compared very favorably with field conditions which influenced the severity of the disease. Inoculations in the greenhouse with this fungus in diseasefree and sterilized soils produced the disease on healthy tobacco roots.—R. P. Thomas.

10348. SIMMONDS, P. M. Root development in relation to root rots of cereals. Sci. Agric. [Ottawa] 19(7): 475-480. 1939.—Investigations conducted on rootrots of cereals in Saskatchewan, especially in relation to root growth, are used as a basis for certain interpretations on the reactions caused by these diseases. 3 types of root disease are mentioned: take-all, browning, and common rootrots. The importance of sound seed is stressed; subnormal seeds produce plants which are susceptible to attacks by rootrot fungi. During the seedling period, wheat plants are supported entirely by the seminal or first roots. These roots are frequently attacked by fungi, resulting in severe injury; this is particularly true for take-all caused by Ophiobolus graminis and browning rootrot caused by Pythium spp. Infections by common rootrot fungi such as Helminthosporium sativum and Fusarium spp. are considered chiefly in respect to post-seedling invasions of the crown and subcrown zones. The 2 root systems, the seminals and crown roots, are discussed in regard to environmental conditions as well as reactions caused by artificial injuries such as amputations. Some observations, with their physiological and pathological implications, are presented on the possibilities of a wheat plant supported only by the seminal roots.-P. M.

10349. SNYDER, W. C., and B. A. RUDOLPH. Verticillium wilt of pepper, Capsicum annuum. Phytopath. 29(4): 359-362. 1 fig. 1939.—V. albo-atrum was isolated consistently from certain fields of diseased pepper plants. Anaheim Chili and Red Chili peppers grown in the greenhouse under controlled conditions, inoculated with these Verticillium cultures by introducing the fungus into pots of soil in which these vars. were growing, showed wilt symptoms within 10 weeks after inoculation, and the wilt became especially severe on Anaheim Chili. Vascular discoloration extended to the tips of diseased plants and the fungus was readily recovered from this tissue. Verticillium may have been the cause of some of the vascular mycosis attributed to

Fusarium.-W. C. Snyder.

10350. TASUGI, H., and Y. IKEDA. Microorganisms on the rice grains hulled by disc-mill huller and rubber-roll huller. [In Jap.] Ann. Phytopath. Soc. Japan 8(4): 339-342. 1939.—The writer examined the occurrence of microorganisms on rice grains hulled by these 2 methods after 2.4 and 6 mag of storage. He recorded According to the control of the contr 2, 4, and 6 mos. of storage. He recorded Acrocylindrium, Alternaria, Brachysporium, Cladosporium, Epicoccum, Fusarium, Helminthosporium, Mucor, Penicillium, Piricularia, Thyrrcoccum, and bacteria. The kinds of micro-organisms and their abundance differed with time in storage, % of moisture of the hulled grains, and the kind of huller used. The abundance of fungi decreased, while bacteria increased, with time in storage. On grains hulled by a rubber-roll huller, the fungi were generally fewer than on those hulled by a disc-mill huller.—Y. Tochinai. 10351. WATANABE, T. Studies on a new Phoma

disease of Udo salad plants. [In Jap. with Eng. summ.]

Ann. Phytopath. Soc. Japan 8(4): 271-297. 13 fig. 1939.— A new disease of Udo (Aralia cordata) caused by Phoma araliae var. microspora is descr. The fungus attacks the stems, leaves and flowers. Lesions on the stems are brown blisters and elliptic spots which gradually enlarge to 3-11 × 1-2 mm. The leaves bear red-violet spots, and wither or shrivel, as do also the flowers at length. The fungus grew well on potato decoction agar and several other media. The optimum temps for mycelial growth were 25°C on apricot decoction agar and 22° on soy agar. The minimum and maximum temps. were 10° and 30°-35°C resp. The opt. pH for growth on Richards' synthetic agar medium was pH 6.8, and the most favorable sucrose conc. in this medium was 2%. The best germination of pycnospores in relation to temp., pH, and sucrose conc. was attained at 25°C on apricot decoction agar, at pH 6.8 on Richards' synthetic agar, and at 2% in the same medium resp. Killing occurred within 80 min. at 55°C, 60 min. at 60° and 10 min. at 65° in dry condition. Mycelial growth was checked by 0.005% HgCl₂, 0.3% of CuSO₄ and 1% of kupoid in Richards' nutrient soln. Inoculation of wounded leaves and stems with pycnospores gave rise to lesions after incubation periods of 7-10 days.—Y. Tochinai.

10352. WILDE, S. A., and D. P. WHITE. Damping-off as a factor in the natural distribution of pine species. *Phytopath.* 29(4): 367-369. 1 fig. 1939.—Greenhouse study has shown a close correlation between the composition of soil and susceptibility of Pinus spp. to damping-off. On silicious and susceptibility of *Pinus* spp. to damping-oil. On silicious sandy soils none of the pine spp. suffered losses greater than 8% from parasitic fungi. On heavy mull soils, derived from calcareous material, *P. resinosa* was almost completely destroyed (96% loss), survival of *P. strobus* was less than 50%. The losses with *P. nigra* were negligible presumably because *P. n.* occurs naturally on heavy calcareous soils. Damping-off may be a factor limiting the natural distribution of pines on the heavy calcareous soils of southern Wisconsin. The advisability of establishing extensive plantations on these soils is questioned, because the planted stands may be doomed to extinction or costly clear cut manage-

ment.-Authors.

10353. WILLISON, R. S. Brown rot of peaches in transit and storage. Sci. Agric. [Ottawa] 19(7): 458-474. 1939.— During 1933-1937, a study was made of the incidence of brown rot (Sclerotinia fructicola) (a) in variously treated packs of wrapped peaches of the vars. Rochester and Elberta shipped from St. Catharines, Ontario, to the Canadian West and to England, and (b) in duplicate lots held at St. Catharines. For either var., the later picks were more susceptible to rot than were the first picks of the season. In general, sprays of wettable sulphur which could be applied immediately before harvest gave more uniformly satisfactory control than those which had to be applied 2-3 weeks earlier. Dusting with S was also satisfactory except when rain intervened before harvest. Wastage from bruises and, to a lesser extent, from rots was reduced by careful handling. The incidence of rot usually increased when cooling of the fruit was delayed for 24 hrs. or more and was influenced more by conditions before, during and after harvest than by differences in varietal susceptibility. High humidity during transit and holding tended to reduce the effectiveness of fungicides. While S. fructicola was predominantly responsible for losses, Rhizopus nigricans also assumed importance in some cases.-R. S. Willison.

DISEASES CAUSED BY BACTERIA

10354. HORNBOSTEL, W. Versuche über Wurzelkropfbekämpfung. Zeitschr. Pflanzenkr. 49(1): 1-11. 5 fig. 1939.—Crown gall, caused by Pseudomonas tumefaciens, could be greatly reduced in apple and pear stocks by allowing 2-20 days for callus formation between root pruning and planting. Treatment for 10 min. in 1.5% Uspulun reduced the number of galls developing on the roots but did not reduce the proportion of infections at the pruned surfaces, which are especially dangerous and injurious for new rooting. Wounded root-crowns of 1-year-old apple stocks remain liable to attack only about 2 days, those of pear stocks about 10 days. After 7 months there were galls on 63-78% of the apple stocks that were severely pruned and injured, treated with infectious material containing a pure culture of the bacteria or macerated galls from older plants, then planted immediately. Apple stocks kept in moist straw at low or moderate temps. for 2 days after root pruning with injury and before inoculation and planting were not infected. With a longer time between pruning and planting there was some infection. Disinfection with 1% Uspulun or Ceresan solns. or 0.5% Abavit soln. is advised for the wrapping places. Root-pruned stocks should be treated with 1% Uspulun or Ceresan paste before they are wrapped.—H. Hart.

10355. RACICOT, H. N., D. B. O. SAVILE, and I. L. CONNERS. Bacterial wilt and rot of potatoes—some suggestions for its detection, verification, and control. Amer. Potato Jour. 15(11): 312-318. 4 fig. 1938.—This comparatively new and serious disease has already been shown to be due to an organism resembling both Phytomonas michiganensis and P. sepedonica. The trouble appears to be spreading, but its geographical distribution is not fully known though it has been reported from widely scattered localities in N. America. The symptoms are described. The most important mode of overwintering is said to be in slightly affected tubers, from which it is readily spread by the cutting knife. Control measures are discussed, the chief of which lies in the use of disease-free seed. The importance of prompt and correct diagnosis is stressed, and directions for making smears from vines and tubers and for collecting and mailing specimens are given.—Courtesy Exp. Sta. Rec.

10356. RIKER, A. J. Physiological relations between host and parasite in crown gall—an example of basic biological research with plant materials. Amer. Jour. Bot. 26(3): 159-162. 3 fig. 1939.—Some advantages are listed that plant materials have over animal materials for basic work in cellular pathology. Recent investigations with crown gall, caused by Phytomonas tumefaciens, are discussed as examples of work on the broader question of atypical and pathological cell multiplication. The cell stimulating interactions between the host and parasite are considered particularly in relation to research in (1) bacteriology, (2) biochemistry, and (3) plant physiology. Two important safeguards are presented against premature conclusions.—A. J. Riker.

VIRUS DISEASES

10357. BLACK, L. M. Inhibition of virus activity by insect juices. *Phytopath*. 29(4): 321-337. 1939.—Juice of the clover leafhopper, *Aceratagallia sanguinolenta*, carrying potents yellow dwarf virus failed to make the control of tato yellow-dwarf virus, failed to produce any lesions when rubbed upon Nicotiana rustica. Juice from yellow-dwarf N. rustica plants was rendered noninfectious by adding leafhopper juice. Juices of other insect vectors interfere with the infectivity of other plant viruses. Since yellow-dwarf virus is unstable, the inhibitor in leafhopper juice was studied through its action in reducing infectivity of tobacco-mosaic virus. Reduction in infectivity follows immediately upon addition of the inhibitor to the virus and is independent of the time inhibitor and virus are in contact. Percentage reduction in infectivity is dependent chiefly upon the conc. of the inhibitor and is affected very little by conc. of the virus. Juice from 0.15 mg. of clover leafhoppers, containing about 0.0015 mg. of protein N, reduces the infectivity of 1 cc. of a tobacco-mosaic virus soln. by 50%. The inhibitor is nondialyzable, thermolabile, and unstable in acid or alkaline soln. The infectivity of certain mixtures of tobacco-mosaic virus and inhibitor can be increased by dilution or heat treatment. Infectivity of tobacco-mosaic virus in practically noninfectious mixtures was completely restored when the inhibitor was removed by ultrafiltration

or ultracentrifugation.—L. M. Black.

10358. GRAINGER, JOHN. Temperature relations of tobacco-mosaic virus and its host. Phytopath. 29(5): 441-448. 1 fig. 1939.—Activity of tobacco-mosaic virus (as measured by its rate of travel within the tobacco plant) has a temp. optimum (70-85°F) different from that of its host (70°F, as estimated by rate of growth of the shoot). Both rates were measured, first in greenhouses at various temps., and later in constant temp. chambers maintained at the required values, with humidity and light standardized. Lowtemp. masking of symptoms, reported earlier by the same

author, is confirmed; growth of a mosaic-infected tobacco plant at 48°F resulted in the production of symptomless leaves.—J. Grainger.

10359. HILDEBRAND, E. M. Currant mosaic. Phytopath. 29(4): 369-371. 1 fig. 1939.—A new virus disease characterized by chlorotic patterns on the leaves was found on red currants (Ribes rubrum) in New York. The more advanced stages are marked by stunting and a decline in vigor and fruitfulness, which result in dieback and subsequent death of diseased plants. Transmission was effected.—E. M. Hildebrand.

10360. HOLMES, FRANCIS O. Proposal for extension of the binomial system of nomenclature to include viruses. Phytopath. 29(5): 431-436. 1939.—The author discusses the desirability of a Latin binomial system for naming viruses, to replace the numerical systems now current, and proposes the following classification:—Kingdom VIRA; Division PHYTOPHAGI—viruses parasitic in plants; Class SCHIZO-PHYTOPHAGI—parasitic in Schizophytes; PHAGACEAE—bacteriophages; PHAGUS, with spp. minimus, paryus, dysenteriae, astrictus, coli and maximus, for bacteriophages S 13, C 13, D 13, D 3, C 21, and D 4, respectively; Class SPERMATOPHYTOPHAGI—parasitic in flowering plants; CHLOROZENACEAE—causing the yellows group of plant diseases; CHLOROGENUS, with sp. callistephi—aster-yellows virus; C. c. var. vulgaris—typical strain of aster-yellows virus; C. c. var. attenuatus—heat-attenuated strain; C. c. var. californicus—celery-yellows strain of aster-yellows virus; C. persicae—peach-yellows virus; C. p. var. vulgaris typical strain; C. p. var. micropersica—virus of little-peach disease; C. rosettae—peach-rosette virus; C. solani—potato witches'-broom virus; C. santali—sandal-spike virus; C. witches-forom virus; C. santan—sandar-spike virus; C. vaccinii—cranberry witches'-broom virus; C. fragariae—strawberry witches'-broom virus; MARMORACEAE—viruses of the mosaic-disease group; MARMOR with sp. M. tabaci—tobaccomosaic virus; M. t. vulgare—green-mottling, distorting strain; M. t. var. aucuba—tomato aucuba mosaic strain; M. t. v. obscurum—masked-symptom strain; M. t. v. deformans—tomato enation-mosaic strain; M. cucumeris cucumber-mosaic virus; $M.\ c.\ v.\ vulgare$ —common cucumber-mosaic strain; $M.\ c.\ v.\ upsilon$ —potato vein-banding strain; $M.\ c.\ v.\ commelinae$ —southern celery-mosaic strain; M. c. v. lilii—lily-mosaic strain; M. dubium—potato-mottle, or X virus; M. d. v. vulgare—mottle virus proper; M. d. v. annulus-potato-ringspot virus; M. d. v. obscurum-maskedmottle strain; M. erodens—tobacco-etch virus; M. e. v. vulgare—etch virus proper; M. e. v. severum—severe-etch strain; M. solani—potato mild-mosaic virus; M. abutilon abutilon-mosaic virus; M. aucuba-potato aucuba-mosaic virus; M. maidis-maize-streak virus; M. persicae-peachmosaic virus; M. sacchari—sugar-cane mosaic virus; M. pisi —enation mosaic of pea; M. phaseoli—bean-mosaic virus; M. tritici—wheat-rosette virus; ANNULACEAE—viruses causing ringspot diseases; ANNULUS, with sp. A. tabaci, type sp.—tobacco-ringspot virus; A. t. v. virginiensis—typical strain; A. t. v. kentuckiensis—green-ringspot strain; A. t. v. auratus—yellow-ringspot strain; A. zonatus—tobacco-ringspot 2 virus; GALLACEAE—Fiji disease group, viruses causing diseases characterized by proliferation of rormally inactive tissue; GALLA, with 1 sp., G. fijiensis—Fiji-disease virus; ACROGENACEAE—spindle-tuber group; ACROGENUS, with 1 sp., A. solani—potato spindle-tuber virus; RUGACEAE—leaf-curl group; RUGA, with 3 spp.: R. tabaci—tobacco leaf-curl virus; R. gossypii—cotton leafcurl virus; R. bemisiae—cassava-mosaic virus; Division ZOOPHAGI—viruses parasitic in animals; Class ARTHRO-PODOPHAGI—parasitic in arthropods; Class CHORDATO-PHAGI—parasitic in chordates.

10361. KAUSCHE, G. A. Zur Charakterisierung des Tabakmosaik- und Kartoffel-X-Virus mit der Goldsolreaktion. Biol. Zentralbl. 59(3/4): 194-221. 3 fig. 1939.— Potato X-virus and tobacco virus can be distinguished by the goldsol reaction: the former produces a red flocculation, the latter none. The course of the reaction depends on the degree of purity of the virus prepn. The impurities which affect the reaction are low molecular proteins and perhaps high polymeres of non-proteins. The potato X-virus may produce a violet or blue flocculation, which differs from

the red reaction in regard to the quantitative relations involved. The tobacco mosaic virus does not react with the gold because of a difference in the electrostatic surface

charge. If the potato virus is made salt free, its reaction with the goldsol is inhibited. The 2 virus proteins evidently differ in electrochemical constitution.—A. H. Hersh.

10362. STEVENSON, F. J., E. S. SCHULTZ, and C. F. CLARK. Inheritance of immunity from virus X (latent mosaic) in the potato. Phytopath. 29(4): 362-365. 1939.—U. S. D. A. potato seedling 41956 is immune from at least 6 strains of potato virus X (latent mosaic). Inheritance of this immunity was studied in correspondent solutions. this immunity was studied in crosses between S 41956 and 2 non-immune vars., in a progeny of S 41956 selfed and in progenies of 2 other immunes selfed. 37% of the F₁ of the 2 crosses and from 72 to 78% of the selfed lines were found to be immune. The results can be explained by the usual type of inheritance in autotetraploids. It is assumed that with the genes A and B both necessary for immunity, the immune plants used as parents have the genetic constitution AA aa Bb bb, the non-immune aa aa bb bb.—Authors.

10363. STOREY, H. H. Transmission of plant viruses by insects. Bot. Rev. 5(4): 240-272. 1939.—A review of the literature (90 papers) bearing on the mechanism of insect transmission of viruses and a discussion of the interpretations that have been placed on the evidence. Two types of transmission are recognized; and the main points discussed are the genetical determination of infective ability, the biological cycle and multiplication in the insect, the manner of inoculation by the insect and mechanical transfer on the mouth parts of certain vectors.—H. H. Storey.

NON-PARASITIC DISEASES

10364. LEVINE, MICHAEL. Crown gall-like tumors induced with scharlach red on the plant, Kalanchoe. Proc. Soc. Exp. Biol. and Med. 40(4): 599-603. 4 fig. 1939.—Scharlach red, dissolved in ether and applied to decapitated shoots of K. daigremontiana, produces crown gall-like overgrowths which are characterized by leafy shoots and roots, and which resemble typical crown galls induced by Pseudomonas tumefaciens. Other carcinogenic agents as 1,2,5,6-dibenzanthracene, methylcholanthrene, and benzpyrene applied in lanolin cause injuries to the treated stem without inducing overgrowths on the Kalanchoe. Roots are produced by the Kalanchoes below and above the areas treated with 1,2,5,6dibenzanthracene, methylcholanthrene, and benzpyrene. Indole acetic acid induces an abundance of long, white roots on the Kalanchoe, together with small intumescences which are viable for only short periods. Roots are also produced on injured Kalanchoe treated with lanolin alone. Root formation on the Kalanchoe induced by substances other than the heteroauxin studied here, results from injury which stimulates the host cells to produce root-forming substances. These substances appear to be transported to parts of the

stem below and above the treated areas.—M. Levine.
10365. OSSOWSKI, A. The formation of intumescences containing fatty substances on the stem of Khaya ivorensis. Bull. Miscell. Inform. Kew 1938(4): 137-141. 3 fig. 1938.—The intumescences on the bark of K. ivorensis are due to abnormal growth of tissue belonging to the periderm, and morphologically representing the cork-tissue, but developed as phelloid. The cells of this tissue differ in shape and size from those of the normal cork. They have cellulose walls, and contain masses of a substance shown to be of a fatty nature by its characteristic microchemical reactions. The intumescences and their special fatty contents appear to be quite similar to those previously described by Collens in K. senegalensis.—A. Ossowski.

DISEASES CAUSED BY PHANEROGAMS

10366. STITT, R. E. Dodder control in annual lespedezas. Jour. Amer. Soc. Agron. 31(4): 338-343. 1939.—The life history and control of field dodder (Cuscuta pentagona) as a pest of annual lespedezas in N. Carolina were studied. A partial list of the known host plants is given. Dodder in lespedeza fields germinated from March to Sept. In laboratory tests germination occurred over a period of 101 days. In the field seedlings lived 4-9 days following germination when out of reach of a host plant. Flowering occurred in 21 days and seed was mature 38 days after germination.

Flowering was continuous over a period of 2-3 mos. Screening lespedeza seed failed to remove all the dodder seed A 1/16-inch mesh screen removed 54.89% of the lespedeza A 1/16-inch mesh screen removed 54.89% of the lespedeza and left 170 dodder seed per lb. of clean sample. Dodder can be effectively controlled by burning with a blow torch, cutting out by hand, or spraying with chemicals. Effective chemicals were (a) a 2.5% aqueous soln. by weight of H₂SO₄; (b) 1 lb. of NH₄SCN in 2 gallons of water, and (c) 1½ lbs. of "Atlacide" per gal. of water. These killed all plants of both dodder and lespedeza when thoroughly moistened by spraying.—R. E. Stitt.

PARASITISM AND RESISTANCE

of "plum pocket." [In Jap.] Ann. Phytopath. Soc. Japan 8(4): 331-335. 1 fig. 1939.—The length of plum fruits attacked by Taphrina pruni is increased by both hypertrophic and hyperplastic cell changes; the diam. of the fruit, by hypertrophic changes only.—From abstr. by Y. Tochinai.

10368. BUCKSTEEG, W. Über die Monilia-Anfälligkeit unserer Obstsorten. Zeitschr. Pflanzenkr. 49(1): 11-15. 1939.

—It is now possible and advisable to cull out fruit varieties susceptible to the Marilia disease and replace them with

susceptible to the Monilia disease and replace them with resistant vars. Apple and cherry vars. of Germany were listed according to their resistance, and pear vars. were discussed from the work of Klöck in lower Austria. Of 46 cherry vars. 14 were resistant to Monilia, Früheste der Mark being especially resistant. 12 were weakly susceptible, 19 moderately susceptible, and 1, the Schattenmorelle cherry, was extremely susceptible. Of 44 apple vars. 21 were resistant, and 9 of these were more resistant than the others.

11 were weakly susceptible, and 14 were moderately so. From Klöck's work, 38 pear vars, were free from disease, 3 were weakly attacked, and 3 were severely attacked.—H. Hart.

10369. GRANT, THEODORE J., and PERLEY SPAULD-ING. Avenues of entrance for canker-forming Nectrias of New England hardwoods. *Phytopath*. 29(4): 351-358. 1 fig. 1939.—Observations and measurements were made of 3161 Nectria cankers occurring on various hardwood spp. in several New England forests. Also 2 series of inoculations were made close to the axils of branches. The field studies showed that branches on hardwoods and especially the small young branches, buds, and short spurs on birches often serve as avenues of entry for the canker fungus. Branches over 2-inch in diam. do not serve as avenues of entrance for Nectrias into larger branches or trunks unless infection occurs at or very close to their axils. Infection usually occurs through living or dying branches rather than through dead branch stubs. The size of the branch attacked, the time of year that injury occurs, and the host reactions are important factors in canker development. In general, small stems are more readily girdled than large ones, and fall and winter injuries appear more important than injuries occurring in the late spring or early summer, when prompt activity of the cork cambium may help to check early

stages of invasion by the canker fungus.—Authors.

10370. MEAD, H. W. Shrivelling of wheat kernels by stem rust and its effect on seed value. Sci. Agric. [Ottawa] 19(7): 481-493. 1 fig. 1939.—Analyses of shrivelled and normal kernels of Marquis wheat indicated that the formation of endosperm tissue tends to be retarded by stem rust more than that of any other tissue of the kernels. Green-house tests showed that there were more germinable kernels per bushel of shrivelled wheat than of normal wheat. Seedlings from shrivelled kernels were shorter, lighter in weight, and had smaller root systems than normal seedlings. These weak seedlings were more susceptible to common rootrot, and were unable to withstand cutting back as well as plants from normal seed. They were just as resistant to drought and frost as normal plants. Formalin injured shrivelled kernels; New Improved Ceresan and Leytosan were slightly beneficial. Despite the apparent weakness of plants from shrivelled wheat, good stands and yields were obtained from field tests of the same seed in 1936. The results of these tests were corroborated by the results of a provincial survey of areas where shrivelled wheat was sown.-H. W. Mead.

10371. ROGERS, C. H. The relation of moisture and

temperature to growth of the cotton root rot fungus. Jour. Agric. Res. 58(9): 701-709. 1 fig. 1939.—Mycelial strands of Phymatotrichum omnivorum grew in Houston black clay soil in which the soil moisture varied from 15 to 35%, ovendry basis. The opt. moisture content was around 25%, i.e., 35% of the max. water-holding capacity of the soil. Sclerotia were produced at a soil moisture content of 15-30%. Neither sclerotia nor mycelial strands grew at or below 8% or above 35% soil moisture. Both mycelial strands and sclerotia were produced in constant-temp, baths at 11°-37° C, the optimum for both being approx. 27°. At 3°, the lowest exptl. temp., there was no growth, but apparently the fungus was not injured. Temps. of 39° and above killed the fungus. At the lower temps, the sclerotia and mycelium formed were of a whitish-amber color. At the min, temp. at which growth occurred this light color was retained during the entire exptl. period. At higher temps. both sclerotia and mycelium were formed with the usual dark color of maturity. Both mycelial strands and sclerotia were rapidly killed by exposure to high temps. or to drying, such as takes place under ordinary field conditions in the summer.—C. H. Rogers.

DISEASE CONTROL

10372. CUNNINGHAM, H. S., and P. H. WESSELS. Controlling common scab of the potato on Long Island by the addition of mercury compounds to the fertilizer mixture and the relation of soil reaction to the treatment. Bull. New York State [Geneva] Agric. Exp. Sta. 685. 1-20. 1939.—Tests were made at the Long Island Vegetable Research Farm, Riverhead, N. Y., of the addition of Hg compounds to the fertilizer mixture for the control of potato scab. Each of these materials was used at the rate of 2, 4, and 6 pounds per ton of fertilizer. One ton of fertilizer per acre was applied. The 4-pound rate was the most effective and each of the materials gave a significant decrease in the amount of scab on soils having a reaction of pH 5.5 or lower. The results are given on the basis of classified scab groups and also the relation of these scab groups to certain pH ranges. Large amts. of either of the Hg compounds may decrease yields. Soil reaction plays an important part in the incidence of potato scab, the scab increasing as the pH readings increase. These results may be applicable only to Long Island conditions and possibly to certain soil types.—H. S. Cunningham.

10373. HEUBERGER, JOHN W., and JAMES G. HORS-FALL. Relation of particle size and color to fungicidal and protective value of cuprous oxides. Phytopath. 29(4): 303-321. 1939.—A series of cuprous oxide powders, ranging in color from red with a particle size of 2.57 μ , λ 6440 Å, through orange to yellow with a particle size of 0.94 μ and λ 5959 Å, was assembled. The fungicidal value was tested in the laboratory with spores of Macrosporium sarcinaeforme. The protective value was tested in the greenhouse and field by the usual techniques on seeds and foliage against Pythium ultimum, Diplocarpon rosae, and Alternaria solani. As the particle size and \(\lambda\) of reflected light decreased, the fungicidal and protective values increased. Thus, it is possible to forecast the probable field performance of cuprous oxides from their color. The probable explanation for the increased fungicidal and protective values of cuprous oxides of small particle size is that the area of chemically reactive surface per unit of weight is increased and that the rate at which soluble Cu is presented to the germinating spore is increased.—Authors.

10374. HUBER, GLENN A., and KARL BAUR. The use of calcium cyanamid for the destruction of apothecia of Sclerotinia fructicola. Phytopath. 29(5): 436-441. I fig. 1939.—Commercial pulverized and oiled Ca cyanamid, applied with a knapsack duster to the surface of the soil and vegetative cover under prune trees at the rate of 220 lbs. per acre at the beginning of apothecial production, destroyed apothecia of Sclerotinia fructicola and prevented the development of others. Similar results were obtained when soil in wooden boxes, in which apothecia were developing, was treated with a surface application of Ca cyanamid at the rate of 324 lbs. per acre.—G. A. Huber.

10375. KELSALL, ARTHUR. Thirty years' experience with orchard sprays in Nova Scotia. Sci. Agric. [Ottawa]

19(7): 405-410. 1939.—The development of spraying practices is traced from the use of Bordeaux mixture (with Paris green or Na arsenite) in 1908 by the more progressive growers only, in 2 pre- and 2 post-blossom applications, put on by hand pumping, through lime-sulphur Pb arsenate (about 1910-1912), excess lime with small amts. of CuSO. (1913-1917), dusting (1918-1924), to 6 power applications in 1938 (3 pre- and 3 post-blossom), the first 2 and the last excess lime Bordeaux with Ca arsenate, the 3 intermediate iron-sulphate lime-sulphur with Ca arsenate, or flotation sulphur with Pb arsenate; and the reasons for changing practices are explained. E.g., dusting was discontinued because it could not control the extreme outbreaks of the eye-spotted budmoth (Spilonota ocellana) and the European red mite (Paratetranychus pilosus) which occurred between 1924 and 1927. Present practice with regard to the fixed nicotines, cryolite, phenothiazime, derris, pyrethrum, wettable and colloidal sulphurs, and coal tar and mineral oils is also indicated.—A. Kelsall.

10376. KIDD, F., and C. WEST. Effects of manurial treatments on the keeping qualities of Cox's Orange Pippin apples. [Gr. Brit.] Dept. Sci. and Indust. Res. Ann. Rept. Food Invest. Bd. 1937: 97-101, 1938—Results of investiga—

10376. KIDD, F., and C. WEST. Effects of manurial treatments on the keeping qualities of Cox's Orange Pippin apples. [Gr. Brit.] Dept. Sci. and Indust. Res. Ann. Rept. Food Invest. Bd. 1937: 97-101. 1938.—Results of investigations on the effects of different manurial treatments containing varying amts of N, P, and K on the keeping quality of Cox's Orange Pippins grown upon different root stocks and stored at various temps. and the loss due to fungal wastage and scald show that fruit from all treatments containing K is of better keeping quality and less susceptible to fungal rotting than from treatments where K is omitted, but is more susceptible to low temp. breakdown and scald. K also seems essential for good flavor. Susceptibility to low temp. breakdown is increased by N, and to scald by addition of P. A complete manurial treatment produces the best flavored fruit.—Authors.

10377. MILBRATH, D. G., and H. J. RYAN. A method of control of western celery mosaic. California Dept. Agric. Bull. 27(3): 290-295. 1938.—For many years celery has ranked as a highly important crop in Los Angeles County, Calif., and prior to 1931 the yields had been generally satisfactory. Following that year there was a sharp decline, and a survey in 1933 indicated that western celery mosaic was widespread in the area, with an abundant source of infective material, liberal facilities for the spread and transmission of infection, and high infectiousness for celery. Tests of weeds and other truck plants in the district indicated that other host plants are probably infrequent. The disease was found in great abundance in several districts of this county, but not in San Diego or Orange Counties, though all had planted seedlings from the glasshouses of one of the infected districts. Continuous cropping is practised in Los Angeles County, and the cumulative effect of this cropping practice was probably responsible for the epidemic conditions. Approach to the control problem was directed toward the temporary elimination of the primary host plant, through a voluntary non-celery period set up among the growers, who agreed that no celery should be grown in the field between July 31 and Jan. 1 or in the glasshouse between Sept. 1 and Oct. 20, 1934. Following this drastic measure there was a decided increase in yield accompanied by a higher quality, the control proving most effective during the first 6 mo. of the year. While this method, enforced in a limited area, was gratifying in results, it would not necessarily be effective in other localities.—Courtesy Exp. Sta.

10378. SORAUER, PAUL. Pflanzenschutz; Verhütung und Bekämpfung der Pflanzenkrankheiten. Handbuch der Pflanzenkrankheiten Bd. 6. Pt. I. xii +647p. 63 fig. Paul Parey: Germany, 1939. Pr. 34.50 M.—Conforming to the standards of scope, thoroughness, and authority of preceding volumes in the encyclopedic Handbuch der Pflanzenkrankheiten begun by Soraurer and continued by Appel, this book presents by far the most complete assemblage of information dealing with plant disease control that has yet appeared. Part I, consisting of 2 sections, is the work of 10 specialists whose contributions are: The agricultural importance of plant protection by H. MORSTATT; Plant hygiene and quarantines by H. BRAUN; Soil disinfection by H.

THIEM; Seed disinfection by E. RIEHM; Physical means of plant disease control by W. TRAPPMANN; Chemical means of plant disease control by W. TRAPPMANN, G. HILGENDORFF, A. WINKELMANN, W. FISCHER, and W. TOMASZEWSKI; Biological testing of plant protectants by A. WINKELMANN and H. KLINGER; Physical and chemical testing methods by G. HILGENDORFF and W. FISCHER. The editorial supervision of the whole volume is by O. APPEL. A mere list of the chapter headings occupies over 4 pages, but a better idea of the extent and the detail of the text is given by the 12 sections under "Chemical Soil Disinfection," viz., sulfur and sulfides, acids, ammonia compounds, arsenicals, light metal compounds, heavy metal compounds, organic S compounds, phenols, etc., hydrocarbons and mineral oil, tar compounds and derivatives. The discussion of the chemistry of, and chemical tests for, all these compounds is especially valuable since this information has not heretofore been so readily accessible to phytopathologists. Copious bibliographic references are given in footnotes throughout the text.—F. Weiss.

10379, STARR, G. H. Treating cottonwoods for chlorosis.

10379. STARR, G. H. Treating cottonwoods for chlorosis. Jour. Colorado-Wyoming Acad. Sci. 2(5): 34. 1939.— Chlorotic cottonwood trees in dormant condition treated with ferric phosphate applied in holes bored in the lower trunk responded with production of larger and greener leaves than untreated trees. 5 g. of ferric phosphate for each inch of diam. of the tree appeared to be optimum dosage.—
F. Ramaley.

10380. STEPHENS, R. P., and W. B. GOLDSCHMIDT. Some aspects of wattle pathology. A preliminary report 1938. S. African Jour. Sci. 35: 320. 1939.—As a result of recent radical changes in silvicultural practice, involving the early reduction of plantations to relatively few trees per acre, several root diseases which have always caused a percentage mortality have assumed greater importance. Abnormal growth due to Jassid and Capsid attacks are also more serious in these faster growing plantations. Gummosis, a necrotic condition confined initially to the phloem, causes serious damage. These diseases are here described and possible lines of attack are reviewed, with primary considerations given to the nutritional aspect of plant immunity to disease, especially the rôle played by "trace elements."—Authors.

given to the nutritional aspect of plant immunity to disease, especially the rôle played by "trace elements."—Authors.

10381. THOMAS, A. V. The prevention of "blue stain" in jelutong timber. Malayan Forester 8(1): 18-21. 1939.—

Blue stain of jelutong (Dyera costulata was used in these expts.), believed to be due to Diplodia, is retarded by keeping the timber in dry, well-aerated piles, but is likely to develop in planks or in boards thicker than ½ in., however well aerated. In these expts. 3-in. planks were dipped in various preservatives; Lignasan and Na silicofluoride were slightly more effective than borax for this purpose.

ECOLOGY

Editors

W. C. ALLEE, General Animal Ecology G. D. FULLER, General Plant Ecology CHANCEY JUDAY, Hydrobiology (Oceanography, Limnology)

FREDERICK A. DAVIDSON, Ecology of Wildlife Management—Aquatic W. L. McATEE, Ecology of Wildlife Management—

W. L. McATEE, Ecology of Wildlife Management— Terrestrial ROBERT G. STONE, Bioclimatics, Biometeorology

(See also in this issue Entries [GENERAL AND ANIMAL ECOLOGY]: Geographical pathology, 11698; Sedge-mosquito associations, Maryland, 12214; Bacteria affecting endomixis in Paramecium, 12280; Diplopods associated with bird and mammal nests, 12318; Zoogeography of myriopods of Mauritius, 12319; Adaptation of Eriocheir in Europe, 12325; Zoogeography of Curculionidae of Wallacea, 12345A; Desert adaptations in Scarab beetle, 12352; Lepidoptera of French Alps, 12392; Emergence of Lepidoptera, 12396; Social behavior in caterpillars, 12398; Trichoptera, 12408. [PLANT ECOLOGY]: Moss communities of Sardinia, 11838; Ecol. anatomy of Solenostemma, 11899; Cotton mycorhizas, 11945; Germination of grass seed, 11957; Soil erosion control, 11959; Soil pigmentation in U. S., 11964; Sub-surface erosion in S. Africa, 11966; Erosion control, 11988; Exotic plants cultivated in Netherlands, 12014; Photosynthesis in Alpine plants, 12084; Gas exchange of lichens, 12088; pH of leaf sap of conifers, 12118)

GENERAL

10751. CARPENTER, J. RICHARD. The biome. Amer. Midland Nat. 21(1): 75-91. 1939.—The development of the concept of the biotic community is traced through the earlier American and European literature with short quotations from the more important papers. The development of the concept of the biome, a climax biotic community of the size of a formation, sensu Clements, is likewise traced, its units defined, and an example given of its application to the grassland regions of N. America from a recent study by the author. Reference is also made to the development of systems of biotic community classification other than that of the biome and the limitations of their application pointed out.—J. R. Carpenter.

BIOCLIMATICS, BIOMETEOROLOGY

(See also in this issue Entries 10767, 10799, 10803, 10808, 11492, 11957, 11964, 12090, 12396)

10752. JOHNSON, BURT, and CECIL H. WADLEIGH. Certain ecological factors and the cotton plant. Arkansas Agric. Exp. Sta. Bull. 376. 1-51. 47 fig. 1939.—The relations of certain ecological factors to the cotton plant as expressed by the yield of cotton were studied by means of multiple curvilinear correlation for the area comprising the 6 eastern counties of Arkansas and for the period, 1919-1935. The weather factors considered were monthly rainfall, number of rainy days in a month, monthly mean maximum temp., cumulated monthly mean minimum temp., and a combination of monthly rainfall and monthly mean maximum temp. These factors were studied for the period, March to Oct., inclusive, or in some cases during the months of greatest growth of the plant. In general, rainfall in April, May, and July showed high correlation with yield, but there was less co-variability of yield to rainfall in June. Rainfall at or near the minimum reported for these months was associated with the best yields, provided that there was a proper distribution of these small precipitations. Increasingly high monthly mean maximum temps. in May, June, and Aug. are associated with increased yields. Increases in the monthly mean maximum temps, in July above 93°F and in Sept. above 86°F are associated with decreasing yields.—C. H. Wadleigh.

10753. KRÓL, OSZVÁLD. Adatok a növenyek "válságos időszak"-ának kérdéséhez. [The "critical period" of plants.] [With Ger., Fr., and Eng. summ.] Erdészeti Lapok 78(4): 382-393. 2 fig. 1939.—Holdefleiss' method of correlating weather with height growth of trees is applied incorrectly, for he fails to take account of the fact that height growth depends not only on weather but also on the growth energy of the plant. The "critical period" is not exclusively a physiological phenomenon, but also depends on the character of the soil, especially its capacity for making water available for the plant.—W. N. Sparhawk.

10754. MÄDE, A. Das Einfadenwiderstandsthermometer als Messgerät zur Bestimmung der Oberflächentemperatur von Blättern. Bioklimatische Beiblätter 6(1): 11-13. 1 fig. 1939.—Thermocouples are unsuitable for the measurement of leaf temps. because of their high heat capacity and the influence of the surrounding air and the radiation on the thermocouple. A platinum wire-resistance thermometer is

described consisting of a wire 4 cm. long, and 20 μ in diam. The maximum radiation error is only 0.2°C. Continuous records of leaf temps, with this thermometer in a Wheatstone bridge circuit are possible and no influence upon the heat transactions of the leaf is to be feared. A sample record for leaves of Billbergia nutans and Plecanthus fructicosus is reproduced.—H. Landsberg.

10755. MANIG, M. Nachweis von Kaltluft durch erfrorene Dahlien. Bioklimatische Beiblätter 6(1): 22-23. 1 fig. 1939.— Near Schreiberhau (Silesia) early frosts develop in the wake of outbreaks of polar maritime air which lower the air temp. nearly to the freezing point. Heat loss by eradiation and gravitational accumulation of the cold air kill the dahlias in topographic troughs, whose boundaries can be mapped by noting frozen and unharmed dahlias. Potatoes and ferns are similarly affected.—H. Landsberg.

10757. POTZGER, J. E. Microclimate, evaporation stress, and epiphytic mosses. Bryologist 42(3): 53-61. 1939.—An atmometer study of differences in evaporation on north and south sides of trunks of trees, 6 feet above the ground, and bases of trees, located in shallow ravines and flat uplands. Comparison is between similar habitat sites in an open woodlot on the Butler Univ. campus, Indianapolis, Indiana, and a typical beech-maple woods on the Fort Harrison reservation, 15 miles east of Indianapolis. Trunks of trees had as much as 166% greater loss than comparable bases of trees. Comparisons between upland and ravine stations showed differences ranging from 28 to 162% greater losses on the upland stations. As a whole, the stations in the Butler campus woods had greater losses than comparable stations at Fort Harrison. In some cases this amounted to 87.8%. Average weekly losses at the ravine stations in the Butler campus woods were similar to those in the upland woods at Fort Harrison. Apparently, air currents are the chief factor contributing to the differences in water loss in the various habitat sites. Comparing water losses on trees supporting no moss vegetation in ravines on the Butler campus with those on uplands at Fort Harrison, also supporting no moss vegetation, indicates that moisture controls the establishment of moss communities on trees in this

central Indiana region.—J. E. Potzger.

10758. RICHARDS, L. A., and M. B. RUSSELL. A method for recording evaporation from a porous atmometer cup. Iowa State Coll. Jour. Sci. 13(1): 17-19. 1938.—The rate and amt. of evaporation from a porous atmometer cup can be recorded by an automatic drop counter. Water enroute to the porous cup is caused to form in drops in a kerosene-filled chamber, the time of fall of each drop being recorded on a chronograph drum. A graph is given showing the evaporation rate for a 3-week period. The maximum rate occurred between 3 and 6 p. m., the minimum rate between 3 and 6 a. m.—Authors.

10759. SARGENT, F., and A. J. NEDZEL. The cold front and the toxicity of morphine sulphate. Bioklimatische Beiblätter 6(1): 26-29. 3 fig. 1939.—Groups of mice were kept on a normal, an acid and an alkaline diet. A certain quantity of morphine sulphate was injected. The percentages of deaths and the time lapse between injection and death were observed. Mortality was lower in the animals on alkaline diet. After the passing of a cold front the

mortality is greater and the time lag between injection and death is shorter. The less time elapses between the passage of the front of cold air and the injection the faster the animals die and the higher is the percentage mortality.—

H. Landsberg.

10760. SAUBERER, F. Über die Lichtverhältnisse der Binnenseen. Bioklimatische Beiblätter 6(1): 33-41. 4 fig. 1939.—A summarizing report on light measurements in inland lakes with 41 references, mainly dated between 1933 and 1938. The principal topics discussed are: methods, with particular reference to photo-electric cells and light filters; the absolute measurements of radiation in various depths and spectral transmission in various lakes; reflection from the surface; measurements with Petterson's transmission meter and Secchi's plate.—H. Landsberg.

spectral transmission in various lakes; renection from the surface; measurements with Petterson's transmission meter and Seechi's plate.—H. Landsberg.

10751. SCHNELLE, F. Phänologische Studie über die Winterroggenernte 1938 bei einer Eisenbahnfahrt. Bioklimatische Beiblätter 5(1): 18-22. 1 fig. 1939.—The development of the winter rye in the North German Plain west of Berlin was graded from the window of a train by noting the percentage of fields in various stages of harvest, at the end of July 1938. The dry fields, usually corresponding to higher slopes, were more advanced than moist fields. Near forests and waters the development of the rye was retarded. In agreement with the general climatic conditions the territory east of the Elbe river showed more advanced stages of the harvest than that west of the river.—H. Landsberg.

10762. SYDOW, E., G. RIEMERSCHMID, und M. TIEDE-MANN. Messungen der Ultraviolettstrahlung in Lappland und Spitzbergen (unter Vergleich mit der biologischen Erythemwirksamkeit). Bioklimatische Beiblätter 6(1): 29-33. 4 fig. 1939.—Measurements were made with Frankenburger's ultraviolet dosimeter. The variability of the u.-v. radiation within the Arctic Circle does not differ greatly from that observed on the German North Sea coast. For clear sky the relation of the intensity to solar elevation was as follows: at 10°, 25°, 35° and 45°, 1, 3, 7 and 12 dosimeter units, respectively. On cloudy days the values were about \(\frac{1}{2} \) as great. Measurements on the peak of Stuor J\(\text{art} \) at a great. Measurements on the peak of Stuor J\(\text{art} \) at a great. Measurements on the peak of Stuor J\(\text{art} \) at a great. Measurements on the peak of Stuor J\(\text{art} \) at a great. Measurements on the peak of Stuor J\(\text{art} \) at a great. Measurements on the peak of Stuor J\(\text{art} \) at a great. Measurements on the peak of Stuor J\(\text{art} \) at a great. Measurements on the peak of Stuor J\(\text{art} \) at a great. Measurements on the peak of Stuor J\(\text{art} \) at a great. Measurements on the peak of Stuor J\(\text{art} \) at a great. Measurement on the peak of Stuor J\(\text{art} \) at a great. Measurement on the peak of Stuor J\(\text{art} \) at a great. Measurement on the peak of Stuor J\(\text{art} \) at a great. Measurement on the peak of Stuor J\(\text{art} \) and at 40° solar elevation, 55%. For solar elevations above 25° the relation between radiation intensity (I) in dosimeter units and the time (t) in minutes elapsing before the first appearance of erythema on skin of average sensitivity is It = 250. Erythema developed at low solar elevations of 16° in 40 min. and of 8° in 3 hrs. This was due to long wave lengths which are not properly recorded by the dosimeter.—

H. Landsberg.

10763. WILSON, J. D., and R. R. PATON. Comparative evaporation rates in a normal forest, open park, and cleared areas. Ohio Agric. Exp. Sta. Bimo. Bull. 24(198): 64-69. 1939.—Evaporation was measured over a period of 4 yrs. for sites of different exposure in 4 state parks or nurseries by means of black and white atmometers. The light which penetrated the foliage of a normal forest and a park-like area (as measured at the 4-foot level by the difference between black and white atmometers) was 10.5 and 41%, respectively, of that in a cleared area, over a 16-wk. period from June 1 to Sept. 20. These B-W values made up 29.6, 18.8, and 9.1% of the total loss from the black atmometer in the cleared, open park, and normal forest areas, respectively. White atmometers (which measure effect of all factors but sunshine) lost 77 and 46% as much water in the open park and normal forest areas as in a clearing, respectively.—J. D. Wilson.

10764. WINKLER, C. A. Dew-point hygrometer for use at low temperatures. Canadian Jour. Res. Sect. D 17(2): 35-38. 1 fig. 1939.—An apparatus is described in which provision for slow cooling of a metal mirror by circulating over it liquid from a vessel in a thermoregulated bath, and the use of multiple thermocouple elements contained in the mirror, enable the dew-point temp. to be gradually approached and accurately detd. Precise measurements of relative humidity at low temps., where the moisture content of the air is small, are therefore possible. A precision of ± 0.5% relative humidity was readily attained at temps. down to -15°C.—Auth. abst.

ANIMAL

10765. ADAMSON, A. M. Review of the fauna of the Marquesas Islands and discussion of its origin. Bernice P. Bishop Mus. Bull. 159. 1-90. Map. 1939.—The land and freshwater fauna is reviewed and analyzed. The geography, geology, flora, etc., of the islands are considered in relation to the origin and development of the fauna. Biogeographical theories regarding central Pacific islands are summarized and discussed—no comprehensive modern scheme, to replace the obsolete scheme of Wallace and his followers, has yet been proposed. The affinities of the Marquesan fauna are largely Indo-Malayan, and its history began not later than the early Tertiary. The way in which central Pacific islands acquired their faunas and floras remains obscure, but an attempt is made to outline the possible history of the Marquesan fauna, 1) on the assumption of extensive former land-connections, and 2), according to the alternative view that all islands within the Pacific depression are strictly oceanic and dependent on overseas dispersal alone.—A. M. Adamson.

10766. DETHIER, V. G. Further notes on cannibalism among larvae. Psyche 46(1): 29-35. 1939.—Larvae of Estigmene acrea and Isia isabella (Lepidopt.) attacked and ate mutilated insects more readily than uninjured insects. Living victims were rendered quiescent by buffeting before being eaten. Crowding increased the percentage of cannibalism, apparently by increasing the frequency of chance meetings. Phytophagous larvae were successfully raised to maturity on a meat diet. Proteases and diastases were found in the guts of these animals and a histological examination of the feces showed that most of the constituents of a meat diet were utilized. Additional cases of cannibalism in nature and in the laboratory are reported.—V. G. Dethier.

10767. GLICK, P. A. The distribution of insects, spiders, and mites in the air. U. S. Dept. Agric. Tech. Bull. 673. 1-150. Map, 5 pl. 1939.—Specially devised traps to collect insects were attached to airplanes at Tallulah, Louisiana. During a 5-year period, from Aug. 1926 to Oct. 1931, 1,314 flights were made in Louisiana and 44 in Mexico. 30,033 specimens of insects, spiders, and mites were taken at altitudes ranging from 20 to 15,000 feet. 18 orders of insects and the orders of spiders and mites were collected. There were represented in the Louisiana collections 216 families, 824 genera, 4 new genera, 700 spp., and 24 new spp. The order Diptera was the most abundant order in the air, and nearly 3 times as many specimens were taken of this as of any other order. Coleoptera followed next after Diptera in the numbers taken. Homoptera and Hymenoptera were taken at 14,000 ft., the highest altitude at which insects were found. The highest altitude at which any specimen was taken was 15,000 ft., at which a spider was caught. Numbers of adults, nymphs, and larvae of wingless forms of insects and mites were collected in the upper air at altitudes as high as 14,000 feet. These wingless forms are all at the complete mercy of the upper air currents. There is much evidence to support the conclusion that many of the insects taken in the upper air were alive at the time they were collected. Many specimens were alive when removed from the screens. The insects are listed in detail with the altitudes at which they were taken in several tables. The size, weight, and buoyancy of an insect contributes directly to the height to which it may be carried by air currents, and this may be expressed in terms of the aerostatic or lighter-than-air coefficient. The aerostatic coefficient varies directly with the area of the insect which is exposed perpendicular to the pull of gravitation and inversely with the weight per unit of exposed area. The numbers of insects taken followed closely the differences in the surface vapor pressure, dew point, temp., and wind direction. Spiders were found to be affected by dew point and barometric pressure. The maximum numbers of insects were found at sunset. There was a tendency for insects to be more active in the upper air on nights when there was considerable moonlight. Convection currents and turbulence of the air play an important rôle in determining the insect population in the upper air. Flights over the area flooded at Tallulah, La., in 1927 showed that fewer insects were in the air at lower altitudes, but at altitudes of 1,000 ft. and above the numbers taken were approx. the same as over the non-flooded territory, indicating that insects flew or drifted in. Pink bollworm moths were collected in Mexico at as high as 3,000 ft., indicating that the moths are carried in the upper air currents for considerable distances. Modern aircraft offer a new source of danger in the dispersal and distribution of diseases and

dangerous insect pests.—P. A. Glick.

10768. GRAHAM, SAMUEL A. Forest insect populations.

Ecol. Monogr. 9(3): 301-310. 1939.—Economically important forest insects probably represent less than 1% of all forest insects. They may be divided into 3 groups: those which maintain balanced populations at high density, those that appear in sporadic outbreaks, and those that occur in periodic outbreaks. The number of spp. in the 1st group is not great; only a few forest insects when in a state of equilibrium are sufficiently abundant to cause damage and then injure the trees without killing them (the white pine weevil and the Nantucket pine-moth). Sporadic outbreaks occur as a result of temporarily changed conditions and the insect populations return to normal when usual conditions are restored. Examples are secondary barkbeetle outbreaks along newly constructed roads, near places where fresh wood is stored, and in places where recent thinnings have been made. Periodic outbreaks are most serious of the 3 groups. They are characterized by concentrated populations that appear suddenly, often over tremendous areas. They are usually associated with weather favorable to the insects. with single sp. forests, and with over-mature forests. Repeated eruptions usually occur at relatively regular intervals. Factors involved in stimulating and retarding periodic outbreaks are discussed and attention is drawn to the need for

a long-time sustained research program.—S. A. Graham. 10769. HOLZAPFEL, M. Markierungsverhalten bei der Hyäne. Zeitschr. Morph. u. Ökol. Tiere 35(1): 10-13. 2 fig. 1939.—Hyenas in captivity were observed to mark out a territory by smearing the secretion of the anal glands (presumably odoriferous) upon certain objects in their den or cage. The habit of dogs of urinating upon prominent objects is probably of the same nature.—L. H. Hyman.

10770. KINTER, EDWARD. Notes on Indiana freshwater sponges. Proc. Indiana Acad. Sci. 48: 244-245. 1938 (1939).—Several northern Indiana lakes and streams have been explored to learn something of their sponge popula-tions, mainly from ecological and systematic standpoints. In some lakes no sponges could be found; in others several spp. were quite numerous. Where they were found in a given lake they were usually numerous in its outlet; but in other streams, they were rare or absent. Even in lake outlet they were decidedly more numerous near the lake. Sediment seems to be the chief factor in determining whether they can exist in a given stream.—E. Kinter.

10771. MALUF, N. S. RUSTUM. The longevity of insects during complete inanition. Amer. Nat. 73(746): 280-285. 1939.—Compiled data are presented to show that, in most cases, the duration of insects without food or water does not exceed a few days; but there are notable exceptions. Water is generally the limiting factor. Fat is the main metabolite during starvation. There is no rigorous correla-tion between the standard rate of metabolism of an animal and the length of time it can endure without food and

water.—N. S. R. Maluf.

10772. PARK, ORLANDO, W. C. ALLEE, and V. E. SHELFORD. A laboratory introduction to animal ecology and taxonomy. A laboratory guide with keys prepared with particular reference to fresh-water and terrestrial habitats of the deciduous forest region in North America. x+272p. 17 pl. University of Chicago Press: Chicago, 1939.— This contains an introduction on the interrelationship of animals with their environments followed by a series of exercises on the constituents of the terrestrial and freshwater faunas, and a discussion of faunal percentages and quadrats and of cave animals. Synoptic keys to 21 phyla are carried out to the orders or other large subdivisions with references to the pertinent literature. There is a glossary of technical terms, an extensive bibliography, and

taxonomic and subject indices.—C. A. Kofoid.

10773. SAVELY, HARVEY E. Ecological relations of certain animals in dead pine and oak tree trunks. Ecol. Monogr. 9(3): 321-385. 8 fig. 1939.—A succession of animals, chiefly insects, was found in decaying pine and oak tree

trunks. This succession was conditioned partly by the animals themselves, but principally by the action of woodrotting fungi. The subcortical temp. in pine logs in the summer was as much as 45°C when air temp. was 33°C. In winter, sudden changes in external temp. were buffered by the logs, but the temp. within the logs usually reached the minimum air temp. Air under the bark of rotting logs contained as much as 5.53% CO₂. Larvae of Monochammus titillator, Romaleum atomarium, and Acanthocimus nodosus survived higher temps, in an atmosphere of 10-15% relative thumidity than in one 95-100% saturated. The thermal death points of *Chrysobothris femorata* and *Dendroides bicolor* were not affected by rel. humidity. Larvae of *Callidium antennatum* and *Chrysobothris* spp. fed on phloem of pine and reproduct start the read they attait the pine and removed starch from the wood they ate; they consumed approx. 77 and 79 g. of dry body wt. respectively. Larvae of *Derobrachus brunneus* were able to digest cellulose. The gut contents of 22 spp. of beetles of doubtful food habits were examined. The animals collected from dead pine and oak tree trunks were listed together with data on the stages found, their probable food habits, and the length of time since the tree trunk had died.—H. E. Savely. 10774. WARREN, A. EMERSON. An ecological study

of the sea mussel (Mytilus edulis Linn.) Jour. Biol. Bd. Canada 2(1): 89-94. 1936.—The distribution of the sea mussel beds of the Passamaquoddy bay area is almost exclusively intertidal. The expts. herein reported show that mussels grow most rapidly when constantly submerged. Their general absence below the low tide level, therefore,

is attributed to the particular abundance in this region of the predatory fauna.—A. E. Warren.

10775. WINDECKER, W. Euchelia (Hypocrita) Jacobaeae L. und das Schutztrachtenproblem. Zeitschr. Morph. u. Ökol. Tiere 35(1): 84-138. 9 fig. 1939.—From the literature and the author's own expts. it is shown that the cinnabar moth is distasteful to mammals, birds, reptiles and amphibians and that the bad taste comes from the hemolymph. The fresh pupa is not distasteful but with age develops a badtasting hemolymph. The conspicuous black-and-yellow ringed larvae are also unpleasant to vertebrates because of chemical substances present in the skin. Since vertebrates learn to avoid the moth and larva through experience, the conspicuous coloration of these stages of the insect is a case of protection through warning colors. Exps. showed that birds and mammals remembered the unpalatability of this insect for long periods of time. The *Euchelia* moth further is protected by its great resemblance to another unpalatable lepidopteran Zygaena filipendulae, a case of Müllerian mimicry. The Euchelia larva shows cryptic protective coloration in regard to its host plant (Senecio) when the latter is in bloom. In the absence of these blossoms, the larva is conspicuous and hence an example of warning coloration. It is also protected by the resemblance of its black-and-yellow pattern to that of wasps. The protective value of the conspicuous coloration was shown in expts. with hens which had learned to reject Euchelia larvae; they also rejected mealworms colored so as to resemble *Euchelia* larvae. The results show that cryptic and aposematic coloration and Müllerian mimicry can exist in the same animals. The findings are opposed to the work of Heikertinger.—L.H.Hyman.

PLANT

10776. BEATH, O. A., C. S. GILBERT, and H. F. EPP-SON. The use of indicator plants in locating seleniferous areas in western United States. II. Correlation studies by states. Amer. Jour. Bot. 26(5): 296-315. 1939.—Studies were made of the Se content of 563 specimens of native plants from 12 of the western states, correlating the presence of Se in plants with the geological formation on which the plants grew. Special attention was given to spp. of Stanleya, Oonopsis, Xylorrhiza and Astragalus in these states as primary indicator plants capable of pointing out the presence of Se in formations contemporaneous with known seleniferous formations of Wyoming and also indicating the occurrence of Se in formations not previously investigated. The Stanleya spp. and Astragalus spp., because of their wide distribution, proved especially valuable as indicators. The following have been added to the previously known list of Se-containing formations: (1) Pennsylvanian limestones of S.E. and central Nevada; (2) Payette Lake sediments in S.W. Idaho; (3) Carbonaceous and limy shales in Provo Canyon, Utah; (4) Tertiary sediments in Tonto Basin, Arizona; (5) White Tank Monzonite near Twenty-nine Palms, California; (6) The Moenkopi formation in southern Utah and northern Arizona; (7) Areas in S.E. Idaho, N.W. Utah, S.E. Oregon, and Nevada where the geology was not known to the authors.—O. A. Beath.

10777. CARR, LLOYD G. Some notes on the ecology of plants of Magnolia Swamp, Augusta county, Virginia. Claytonia 5(4): 37-46. 1939.—Upwelling lime spring water, bathing roots of plants growing in mediacid humus, apparently is responsible for the presence of both acid- and lime-loving plants growing together. Some coastal-plain plants, notably, *Magnolia virginiana*, are found in this swamp in the Valley Province, west of the Blue Ridge mountains. An annotated list of the plants is given.—R. S. Freer.

10778. CHAMPION, H. G. The relative stability of Indian vegetational types. Jour. Indian Bot. Soc. 18(1): 1-12. 1939.—Change rather than stability is characteristic of Indian vegetation. The evidence for this view is surveyed and the active agencies are discussed with examples. The most influential are considered to be grazing and burning together with their cessation where formerly prevalent, and modern directive human control. Changes in progress in the different main vegetative types are described, and the need is stressed for ecological studies on account of their scientific interest and their increasingly important economic

value.-H. G. Champion.

10779. CURTIS, JOHN T. The relation of specificity of orchid mycorrhizal fungi to the problem of symbiosis. Amer. Jour. Bot. 26(6): 390-399. 9 fig. 1939.—Ten spp. of Rhizoctonia were isolated from 23 spp. of orchids from various habitats in the U.S. and Central America. Two new species are described—R. borealis, and R. monilioides. No evidence of specificity was found, as one orchid species could harbor several fungus spp., and any one fungus species could attack a number of different orchids. The fungi were correlated with ecological habitat rather than with orchid species. Symbiotic germination tests, using fungi isolated from a given orchid in combination with the seeds of that orchid, indicated in most cases that the fungi were unable to induce germination of the seed. The symbiotic relationship is consulted the orchid and the symbiotic relationship. is concluded to be one of parasite and host, with the orchid deriving no benefit from the fungus in its roots.—J. T. Curtis.

10780. EVENARI, MICHAEL (WALTER SCHWARZ). Root conditions of certain plants of the wilderness of Judaea. Jour. Linn. Soc. [London] Bot. 51(340): 383-388. 1938.—The life form of the roots of 9 perennial and 3 annual plants was investigated. The roots of the annuals penetrate only a few cm (the maximum in *Erucaria boveana* with 7 cm.) and have few secondary roots. The succulent perennials have a superficial root system (Suaeda asphaltica and Zygophyllum dumosum). The main roots of some other perennials (Haplophyllum tuberculatum, Heliotropium rotundifolium, Reseda muricata, Erodium glaucophyllum) penetrate more deeply into the soil and curve through a right angle to continue growing horizontally. Only Retama retam and Atriplex halimus are deeply rooted (to 1.1 m. in Retama). The area occupied by the roots of all desert perennials is very large; e.g., the root system of Retama spreads over an area of 38-39 sq. m. Root competition is absent.—M. Evenari.

10781. GERSBACHER, EVA OXFORD, and EDNA M. NORTON. A typical plant succession at Reelfoot Lake. Jour. Tennessee Acad. Sci. 14(2): 230-238. 1 fig. 1939.—Six fairly distinct plant communities have established themselves in and around this earthquake lake. Complete list of spp., pH of soil, and depth of water are given in each community. A line transect is shown of the 6 zones, beginning with the submerged and extending out into the floodplain. A belt transect illustrates a section of the pioneer tree and flood-

plain area.—E. O. Gersbacher.

10782. GLEASON, H. A. The individualistic concept of the plant association. Amer. Midland Nat. 21(1): 92-110. 1939.—Since plant migration is free and continuous, each area in a region is open to colonization by every species within migrating distance. Since environment continually fluctuates from time to time on the same spot, and from

place to place at the same time and also shows general trends in variation from time to time and place to place, there is accordingly a similar and universal variation and fluctuation in vegetation both in time and in space. Certain features of the environment are reasonably constant over a measureable space, as soil, or through a considerable period, and their vegetation consequently maintains a reasonable homogeneity over an appreciable area and a reasonable permanence for a considerable time. Such areas of vegetation are unit communities. Since every community varies in structure and since no 2 communities are precisely alike or have a genetic connection, a logical classification of communities is impossible.—H. A. Gleason.

10783. JUDD, B. I., and M. L. JACKSON. Natural succession of vegetation on abandoned farm lands in the Rosebud Soil Area of western Nebraska. Jour. Amer. Soc. Agron. 31(6): 541-557. 1939.—During the first 5 yrs., annual spp. predominate. Annual grasses flourish in the 3d yr. and decline rapidly in the 4th to 6th yrs. Agropyron smithii leads the perennial grass entrance, beginning in the 4th yr. and dominating the whole cover in the 6th. At 10 to 15 yrs. nearly all of the cover is composed of the perennial grasses of which 14% is the climax short grasses. A germination study was undertaken in which a high viability of seed was found for all but 3 of the 24 native grasses tested. Similarly, all but 1 of the 15 native legumes showed high viability, when the seeds were scarified. Natural succession of vegetation is important in the Great Plains from an agronomic standpoint in returning abandoned cultivated lands to forage production. After 5 yrs., the yield of grass hay often exceeds

ton per acre in moderately wet yrs.—B. I. Judd. 10784. KILLIAN, C. La biologie des sols argileux des environs d'Alger et la question des plantas indicatrices. Ann. Agron. [Paris] 9(2): 269-300. 1939.—The location and general character of the soils studied-clays and chalksgeneral character of the soils studied—clays and chars—were described in the previously published introduction. The indicator plants chosen were *Hedysarum fiexuosum*, *H. capitatum* and *Scorpiurus sulcata*. These were studied in pure stands, mixed stands and their "stand limits" fixed. Both Hedysarum spp. indicate poor soil with non-permeable subsoil. However, as soon as leaching is evident and the soil podsolizes *H. flexuosum* disappears. *H. capitatum* prefers richer soils, with CaCO₂. Scorpiurus seedlings develop better under a sand layer. It is concluded that relations between soils and any indicator, plant species are highly complex. soils and any indicator plant species are highly complex.

R. R. McKibbin. 10785. MATTHEWS, J. R. The ecological approach to land utilisation. Scottish Forest. Jour. 53(1): 23-34. 1939.— The distribution of damp and dry oakwoods (Quercus robur and Q. sessilifora) is related in Britain to soil type. The ground vegetation is characteristic of each. If birch follows the degeneration of oak this can be recognized by the relict plants. Birch in Highland valleys in Scotland bears no evident relation to pre-existing oak. Its distr. is determined by climate. In sub-alpine regions Scots pine and birch occur and may compete. Degeneration of birch wood gives hill grass, that of pine gives moorland. Within the general types of hill land referred to as rough pasture and moor are many communities. A careful study of these in relation to soil and reaction to grazing is urged, with a view to their correct treatment in agriculture and forestry.—J. A. Macdonald.

10786. MILLER, FRANK J. The influence of mycorrhizae on the growth of shortleaf pine seedlings. Jour. Forestry 36 (5): 526, 527. 1938.—In a Forest Service nursery it was observed that after a satisfactory germination stand the short-leaf pine seedlings growing in soil not in pines the previous year remained dormant during the late spring and summer, while those growing in soil in pines the previous season maintained a consistent rate of growth throughout the entire season. The author suspected these differences to be related to the absence and presence, respectively, of mycorrhizae. A careful study of 3 test plats appeared to confirm this theory. It is believed that the expts. indicate a desirable planting succession to be a soiling crop the 1st yr., pine transplants the 2d yr., 1-0 shortleaf pine the 3d yr., etc. While the data here presented are not considered conclusive, it is believed that their presentation will aid in solving some of the problems found in pine nurseries established in old farm land.—F. V. Rand (courtesy of Exp. Sta. Rec.).

10787. OLSEN, CARSTEN. Undersøgelser over Bund-

floraen i danske Egeskove og Egekrat. [Investigations on the bottom flora of Danish oak-woods and oak-scrub.] Bot. Tidsskr. 44: 367-432. 1938.—The bottom flora in 113 localities was investigated by means of the statistical method of Raunkiaer. The oak-wood, since the Stone Age the dominant type of wood in Denmark, has in the course of historic times nearly everywhere been ousted by beech-woods. Most of the oak-woods existing in Denmark at the present day have therefore been artificially produced; but in a few places in the country remnants of the original oak-woods still occur, and these were included in the investigation. The Danish oak-woods can be divided into 3 main types, viz: (1) Oak-woods can be divided into 3 main types, viz:
(1) Oak-woods on sandy morainic clay. Some of this type occurs on Funen; in a comparatively natural state, not having been under the charge of a forester. As the soil is fertile, the oak-trees (Q. robur) are well-developed, and a dense underwood, 7 m high and composed chiefly of Corylus avellana, is found. The amount of light which reaches the avenum, is round. The amount of light which reaches the forest-ground is 1.5-6% of the daylight in the open and the bottom flora is poor in species. The following spp. dominate: Anemone nemorosa, Oxalis acetosella, Asperula odorata, Allium ursinum, Mercurialis perennis, Melica unifora, Geum urbanum, Stellaria holostea, Pulmonaria officinalis, and Primula elatior; (2) Oak-woods on hard morainic clay. These woods are found only on Lolland, in low-lying, moist, hard clay soil. Oak does not thrive very well in this soil, but the beech thrives more poorly, and the beech-wood has therefore never succeeded in ousting the oak-wood. The underwood consists mainly of Corylus avellana, but Carpinus betulus, Acer campestre, Crataegus oxyacantha, Prunus padus, Lonicera periclymenum, and Hedera helix may also be present. In these woods also the soil is rather deeply shaded. Deschampsia caespitosa, Primula elatior, and Carex silvatica are very dominant in the bottom flora everywhere; and (3) Oak-woods and oak-scrub on sandy soil. This type is found only in Jutland. In some few places oak (Q. robur and Q. sessilifora) forms forests, in most places only scrub, which is chiefly due to the misuse of the forest by man. An open undergrowth, formed chiefly by Juniperus communis and Rhamnus frangula, may occur in the forest. The amount of light reaching the forest-ground is considerable (10-20%), and the bottom flora is consequently rich in species. On mouldy soil the following species exhibit great frequencies: Pteridium aquilinum, Luzula pilosa, Festuca rubra, F. ovina, Poa pratensis, Dactylis glomerata, Holcus mollis, Anthoxanthum odoratum, Melica nutans, Deschamp-sia flexuosa, Convallaria majalis, Majanthemum bifolium, Rumex acetosa, Viola canina, Oxalis acetosella, Fragaria vesca, Veronica chamaedrys, Melampyrum vulgatum, and Phyteuma spicatum. In many places the soil is covered with a raw humus layer and here the bottom flora is poor in species and chiefly made up of Vaccinium myrtillus, Deschampsia flexuosa, and Melampyrum vulgatum.—H. E.

Mossiora. [Investigations on the moss flora of the Skalling.] Bot. Tidsskr. 44(4): 439-458. 1938.—The paper is a result of an investigation made during a stay on the Skalling peninsula (western Jutland), which is little affected by cultivation. It comprises dune, heath, meadow, and marshy ground. There is a list of the mosses found on the peninsula and on the island of Langli situated near the Skalling. A careful investigation of the distribution of the species in the communities was made on the basis of the theory that the bottom layer ("Bodenschicht" according to G. E. du Rietz: Handbuch der biol. Arbeitsmethoden, Abt. IX, H. 2) of the communities is composed of a mosaic of quite small moss communities consisting of one or some few spp. This mosaic must be assumed to be due to a highly varying microclimate and to differences in level. The methodics employed in the investigation was not entirely objective. The statistical method of Raunkiaer must be regarded as little suited for an investigation of the distribution of the mosses in the plant communities.—V. Romose.

mosses in the plant communities.—V. Romose.

10789. ROUSCHAL, ERNST. Zur Ökologie der Macchien.

I. Der sommerliche Wasserhaushalt der Macchienpflanzen.

Jahrb. wiss. Bot. 87(2/3): 436-523. 1938.—The Mediterranean

maqui is characterized by lack of rain and high evaporation

conditions. This results in desiccation of the soil, at the

surface by evaporation, below by the plants. Under these conditions water loss from the leaves and water movement in the soil and into the root system proceed slowly. Some plants, as Cistus, have their roots in the upper 20 cm. of soil where the suction pressure exceeds 80-100 atmospheres, and where roots cannot possibly obtain sufficient water. The suggestion that the leaves may then take up water from dew at night is rejected as of no ecological significance. The diurnal transpiration curve has a sharp maximum between 8 and 9 a.m., a depression at mid-day and a smaller maximum in the afternoon. The morning maximum is due to the rapid increase of evaporation and the opening of stomata in sunshine; the depression is due to the increasing saturation deficit and the closing of the stomata. Mainly in cases of transpiration in the shade a one-peaked curve may be found with this peak early or delayed to mid-day or the afternoon. During the dry season the water loss of all plants diminishes but the water exchange is still considerable in comparison with the fresh wt.—in 13 of 21 plants investigated more than 100% per hr. This high water exchange can only be explained by very high suction pressures. The plants show very high resistance to the rapidly increasing saturation deficits under these conditions. The following types of maqui plants are distinguished: (1) plants with small transpiration, small saturation deficits, e.g., Ruscus, Iris, Smilax. (Schimper's xerophytic type); (2) plants with large transpiration, limited generally by increasing dryness, and with water balance strongly disturbed but balanced by high resistance to drying, e.g., Phillyrea, Cistus, Myrtus, etc. (Maximow's xerophytic type); and (3) plants with high transpiration and small saturation deficit, e.g., Pistacia lentiscus and P. terebinthus, Rubus, the water balance being maintained as the result of a rapid water exchange, only possible with a very well developed most continuous. possible with a very well developed root system. The osmotic value of cell contents in evergreens in a dry period rose to very great heights-increases of 100-200% occurring. Comparative measurements of velocity of water movement in the wood system of the maqui plants by the thermorate wood system of the maquir plants by the thermo-electric method (of Huber) distinguishes 2 types—(a) velocity in stem > in branches (oak type of Huber), e.g., Quercus ilex; (b) velocity in stem < in branch (birch type

of Huber), e.g., Arbutus.—The applicability of the term "summer rest" to the conditions of the woody perennials of the maqui is criticized.—J. H. Priestley.

10790. WEIMARCK, H. Bidrag till Skånes Flora. [Contributions to the flora of Scania (Sweden).] Bot. Notiser 1939(2): 357-392. 19 fig. 1939.—Besides giving extensive lists of species and their distribution the author has devoted a chapter to the importance of mineral soils for the composition of the flora. Lists of species are included giving the classification in Eurytrophs, Oligotrophs, Mesotrophs, and Eutrophs. Another section describes the vegetation in swamps, ponds and lakes. Vegetation boundaries are also established with maps showing the spread and frequence of Erica, Narthecium and Galium pumilum.—T. R. Swanback.

swamps, boths and takes. Vegetation bothdaries are also established with maps showing the spread and frequence of Erica, Narthecium and Galium pumilum.—T. R. Swanback. 10791. WHITFIELD, CHARLES J., and CLAUDE L. FLY. Vegetational changes as a result of furrowing on pasture and range lands. Jour. Amer. Soc. Agron. 31(5): 413-417. 4 fig. 1939.—Contour furrows on range lands in the Southern Great Plains, through reducing runoff and increasing soil moisture storage, encouraged the return of original vegetative types. Density and yield of palatable grass spp. increased, weeds and less desirable grasses decreased.—Authors.

OCEANOGRAPHY

(See also in this issue Entries 12323A, 12337)

10792. COOPER, L. H. N. Phosphorus, nitrogen, iron and manganese in marine zooplankton. Jour. Marine Biol. Assoc. United Kingdom 23(2): 387-390. 1939.—Analyses of P, N, Fe and Mn are recorded for Balanus balanoides nauplii (a cirripede crustacean), post-larval Callionymus lyra (a teleostean fish), mature Sagitta elegans (a chaetognath), Pleurobrachia pileus (a ctenophore) and for crab zoeas and megalopas. A sample of S. setosa contained much more iron than did S. elegans. Pleurobrachia is relatively poor in P, N and Fe and its ash-free protoplasm must be rich in either fats or carbohydrates. Neither Pleurobrachia nor Balanus nauplii effect any appreciable conc. of Mn from sea water.—L. H. N. Cooper.

10793. EDMONDSON, CHARLES H., and WILLIAM M. INGRAM. Fouling organisms in Hawaii. Bernice P. Bishop Mus. Occas. Papers 14(14): 251-300. 9 pl. 1939.—Presents results of a biological survey in which the principal fouling organisms of Kaneohe Bay, Oahu, were determined, and their seasons of greatest productivity, rate of growth, and general ecology were investigated. The organisms include barnacles, bryozoans, serpulid worms, oysters, and ascidians. Minimum growth is in winter. The behavior of various organisms to altered conditions is discussed: also the resistance to temp. changes, fresh water, desiccation, bright sunlight, 9 metals, color of surfaces, poisonous compounds added to paints, and 8 commercial antifouling paints. Bibliography.—E. H. Bryan, Jr.

10794. FRASER, JAMES H. The distribution of Chaetognatha in Scottish waters in 1937. Cons. Perm. Internat. Explor. Mer Jour. Conseil 14(1): 25-34. 1939.— Examination of 1937 Scottish plankton confirms that the distribution of Sagitta spp. is a reliable indication of hydrographical conditions. S. maxima, S. hexaptera, S. serrato-dentata and Eukrohnia hamata are found in the oceanic water entering the area. On mixing with coastal water these are replaced by S. elegans and it is this mixed water that is most conducive to a rich plankton. S. setosa is found in the coastal water of the southern North Sea. The extent of distribution of S. elegans in the North Sea is in direct relationship to the strength of the influx and in 1937 this was greater than in 1936.—J. H. Fraser.

10795. GOODHART, C. B. Notes on the bionomics of the tube-building amphipod Leptocheirus pilosus Zaddach. Jour. Marine Biol. Assoc. United Kingdom, 23(2): 311-325. 3 fig.

Marine Biol. Assoc. United Kingdom 23(2): 311-325. 3 fig. 1939.—L. pilosus lives in a tube which is rather different from that of other spp. The tube is a small blister-like capsule usually attached to the thallus of Chondrus crispus. The homogeneous leathery wall of the capsule is built of minute particles of detritus cemented together by a secretion produced by large glands on the 1st and 2d peraeopods. Final cementing is performed by unicellular glands on the coxal plates. Setae on the 2d gnathopods strain the food particles from the respiratory water-stream flowing down the tube. Being a form of deposit-feeding but differing from the usual type in that the mouth parts are not directly

the usual type in that the mouth parts are not directly involved, it is proposed to use the term "sieve-feeding" for it. Brief observations on the breeding habits are made. The occurrence of copulation is doubtful; parthenogenesis may take place.—C. B. Goodhart.

10796. MOORE, HILARY B., and J. A. KITCHING. The biology of Chthamalus stellatus (Poli). Jour. Marine Biol. Assoc. United Kingdom 23(2): 521-541. 1939.—C. stellatus and Balanus balanoides are littoral barnacles, the former baying a southern and Atlantic distribution, and the latter having a southern and Atlantic distribution, and the latter a northern and North Sea one. In its need for the presence of Atlantic water, Chthamalus is compared with Sagitta elegans and intertidal Echinus esculentus. Wherever the 2 barnacle spp. occur in the same locality, their relative success and ability to survive any given adverse environmental factor is conditioned by the general degree of favorability of the other factors. Extension to low levels on the shore seems to be an indication of favorable conditions. The effects of temp., salinity, immersion, water-movement, sediment, presence of Atlantic water, nature of substratum, competition with B. balanoides, and enemies, are discussed. Some account is given of the growth-rate, and the modification of this at different levels, degrees of wave-exposure and ages .- H. B. Moore.

10797. REES, COLIN B. The plankton in the upper reaches of the Bristol Channel. Jour. Marine Biol. Assoc. United Kingdom 23(2): 397-425. Map. 1939.—Because of the difference in speeds of the tidal streams, the observations made at a single station for a year refer to a length of channel. Gradients of salinity and phosphate, a succession of diatom spp., and a change in the vertical distribution of or diatom spp., and a change in the vertical distribution of Eurytemora affinis, occurred along this length. The movement of water, either from up-channel or down-channel, into the investigated length, changed the average salinity from 22% in winter to 28% in summer. This movement brought a succession of copepods, and possibly diatoms, into the investigated length. The poverty of the phytoplankton, and the absence of and the absence of a normal spring maximum were due to

the inhibiting effect of the instability and extreme opacity of the sea-water. The bacterial analysis indicated sewage pollution.—C. B. Rees.

pollution.—C. B. Rees.

10798. WATKIN, E. EMRYS. The pelagic phase in the life history of the amphipod genus Bathyporeia. Jour. Marine Biol. Assoc. United Kingdom 23(2): 467-481. 1939.—A survey of the Bathyporeia population of the sand of Kames Bay, Millport, during March 1937, showed that 4 spp., pilosa, pelagica, elegans and guilliamsoniana are present and are zoned in relation to tide level. The population contained 15% adult & adult & A series of townettings taken across the tidal waters of the bay at night throughout 1936 showed that the 4 spp. perform nocturnal throughout 1936 showed that the 4 spp. perform nocturnal vertical migrations and retain their zonation when swimming in the tidal waters. An analysis of the tow-net population gave 42% adult 33 and 15% adult 22. A review of the literature indicates that a nocturnal vertical migration is a marked feature of a few benthic amphipod families and possible factors which govern this migration are discussed.-E. E. Watkin.

LIMNOLOGY

(See also in this issue Entries 10760, 12319A, 12323)

10799. ATKINS, W. R. G. Illumination in algal habitats. Bot. Notiser 1939(1): 145-157. 2 fig. 1939.—Formulae are given for the evaluation of submarine illumination at different depths and records are given for light absorption in different parts of the spectrum. The intensity of incident daylight is reduced to 1% at depths ranging from 0.5 to 10 m. or more, depending upon the transparency of the water and the season of the year. Correlated with the intensity of the sub-surface illumination, 3 algal zones were found on estuarine buoys in Plymouth Sound. Plants in Zone I required a high percentage of daylight (more than 80%); those of Zone II, a smaller percentage (25-68%) and those of Zone III, a still smaller amount (0.4-10%). Algae may extend down to a depth of 45 m. and red

10%). Algae may extend down to a depth of 45 m. and red algae have been reported at a depth of 130 m. in the Mediterranean.—T. R. Swanback.

10800. LEONARD, J. W. Mortality of aquatic Diptera due to freezing. Ent. News 50(4): 107-108. 1939.—On April 4, 1938, a small pond in southern Michigan froze over following 2 weeks of unseespeakly high terms which see following 2 weeks of unseasonably high temps. which rose as high as 80°F. A great number of midge pupae (Chironomus plumosus) were embedded in the ice while preparing to transform. The local population of this midge, important in the diet of fishes, may have been severely reduced.—

J. W. Leonard.

10801. MITIS, HEINZ v. Die Ybbs als Typus eines ostalpinen Kalkalpenflusses. Internat. Rev. ges. Hydrobiol. u. Hydrogr. 37(4/5): 425-444. Map, 4 photographs. 1938.— This preliminary announcement of a physical, chemical, and biological survey of the Ybbs, a tributary of the Danube rising near Lunz, describes the physiography and states the aims and methods of the investigation. The system is regarded as typical of streams in regions of youthful landscape, and of the northern Dolomite Alps in particular. Detailed reports on the fauna and flora by various specialists and by the author will follow.—E. S. Deevey.

10802. MIYADI, DENZABURO. Limnological survey of Taiwan (Formosa). Arch. Hydrobiol. 35(1): 1-27. 2 pl., 10 fig. 1939.—Zitugetu-tan is a large lake, formerly with brown water and but 5 m. deep, now owing to the diversion of a river and damming, 36 m. deep, when visited, and with clear water; the bottom deposits are yellowish brown with a black reduction layer at the surface, and are very rich in organic matter. Sango-tan is an entirely artificial reservoir, 18 m. deep, much deposition owing to landslides is occurring and the bottom is poor in organic matter. Kotô-hi is an old reservoir 12 m. deep, only littoral studies were made. Ryûvan-tan is a shallow relic basin of marine origin, astatic and never more than 1.5 m. deep. Toapi-ike is a small lake 3 m. deep, the bottom deposits are reddish brown and poor in organic matter. Rigyo-ti is a natural lake 7.5-9 m. deep, the bottom deposits are soft and yellowish brown, rich in organic matter. Summer surface temps. go little over 30°C, circulation occurs in winter (Jan.) at 18°-20°. In stratified localities even with deposits poor in organic matter (Sango-tan) the O_2 is depleted in the hypolimnion

by the middle of April. The water is generally alkaline and at least moderately rich in Ca, here affording a great contrast with Nippon. It is known, however, that acid waters poor in Ca occur in pools in the mts. of Taiwan. The waters are in general eutrophic, some figures for N and P are given. The transparency is low, in Zitugetu-tan and Rigyo-ti, owing to water blooms, in the other lakes owing to silt. In general the benthic fauna is very poor. In the littoral this is largely due to natural and artificial changes in water-level. In the deep water of Zitugetu-tan there are practically no organisms, in Rigyo-ti, none below 6 m., Sango-tan and Toapi-ike have a small benthic fauna, in the former case composed of Tubifex, in the latter of Tanypinae and a few Corethra. The extensive organic content of the muds of the first 2 may be responsible. Ryûran-tan, high in Ca from water flowing off raised coral reefs, supports a large population of molluses, mostly Melanoides scalva and M. obliquegranosa.—Several recent zoogeographical papers on the freshwater fauna of Taiwan, published in Japanese, are reviewed. Oriental forms predominate, the fauna being nearest that of southern China. Palaearctic affinities are much greater in the fishes than in other groups such as batrachians, northern cold stenotherm forms occur in the mountains. There is little affinity with the Philippine fauna.—G. E. Hutchinson.

10803. PICHLER, WOLFGANG. Ergebnisse einer lim-nologischen Sammelfahrt in den Ostalpen (Steiermark). Arch. Hydrobiol. 35(1): 107-160. 5 pl., 7 fig. 1939.—Twentynine small bodies of water at varying altitudes up to 2000 m. are described in detail. A classification of such waters is proposed on the basis of:—I. Presence or absence of outlet. II. Humus content low, alkaline or neutral, water colorless; humus moderate, weakly alkaline to weakly acid. water from almost colorless to pale yellow-brown; humus high, moorland neutral to strongly acid brown waters. III. Nutrient materials according to the Kolkwitz and Marsson system; in polysaprobe localities a distinction between the effects of cattle dung and dead leaves is important. IV. Temp. in relation to morphometry. The last criterion permits a division into: 1. puddles (Tachen), maximum depth 20 cm., maximum diurnal temp. variation up to 30° C. 2. pools (Tümpel) maximum depth 70 cm., maximum diurnal temp. variation at surface 15° C, at bottom 5° C. 3. ponds (Weiher) and small lakes, maximal depth over 70 cm., maximal diurnal temp. variation 10° C at surface and 2° C at bottom. 4. lakes maximum diurnal variation of temp. in pelagial region of surface 3° C, at bottom no diurnal varia-tion. In the first 2 categories there is little protection against insolation; it is suggested that the red color of high alpine copepods is correlated with high u.-v. light. Daphnia pulex and Chydorus sphaericus are the commonest cladocera in the shallow, strongly illuminated waters; both are more deeply colored than at lower altitudes, the former is rose colored, the latter dark brown. The amplitude of variation in the water level is clearly important in classification. The plankton of lakes is best developed where least water runs through the basin. When the phytoplankton is adequate D. l. longispina is the most conspicuous. Of this animal f. litoralis is the commoner form (as in Sachwiesensee) associated with thermal instability but not with the coldest water; in the cold and very thermally unstable Krumpensee f. rosea transitional to f. friedeli occurs. Only 2 Diaptomidae occur in the lakes, *Diaptomus bacillifer* limited to alkaline waters (5 localities pH 8) and *D. denticornis* found also in ponds and euryionic (25 localities, pH 4.5-8.8). The ponds studied are mostly artificial and at low altitudes. Omitting those lacking Diaptomidae, they are divided into D. zachariasi ponds, shallow and eutrophic and D. denticornis ponds generally humic or high in iron, with a great range of pH values. The pools are divided into alpine meadow pools (Almtimpel), moorland pools, forest pools, springfed pools and swamps. The last 2 types were little studied. Transitional pools occur. The alpine meadow pools are distinguished as: (a) Diaptomus tatricus pools, pH 5.5-7, much influenced by cattle dung, with red-brown water, containing D. tatricus (pH range 4.5-7) with Daphnia pulex obtusa, Sigara carinata (Hemip.) and larvae of Neuronia ruficrus (Trichop.) and in the less acid examples Brachionus sericus: and (b) Heterocypris incongruens pools, pH 6-9, organic matter low, or rapidly decomposed, water never red-brown,

without Diaptomus, with H. incongruens dominant, D. pulex obtusa and B. sericus abundant. Hyalotheca discillens grows in (a) but not in (b). The moorland and forest pools are considered together as constituting a group of acid (pH 4.5-6.5) Ceriodaphnia quadrangula pools, the same pH range is given for this species, on the basis of 9 records. Streblocerus serricaudatus usually occurs, D. pulex obtusa and D. tatricus are casual.—G. E. Hutchinson.

10804. ROLL, HARTWIG. Zur Terminologie des Periphytons. Arch. Hydrobiol. 35(1): 59-69. 2 fig. 1939.—Previous usage is reviewed. The Periphyton may be divided into Epiphyton (Aufwuchs) consisting of the totality of unassociated sessile organisms and the Lasion (Bewuchs), the totality of associated sessile organisms on a substratum A complete series of transitions occurs but the extreme types are very distinct. The distinction is made clear by drawings showing on the one hand single diatoms, protozoa, etc., attached far from each other on pieces of Cladophora (Epiphyton), and on the other a tangled mat of filamentous algae and diatoms with nematods, etc., on a solid substratum (Lasion).—G. E. Hutchinson.

WILDLIFE MANAGEMENT-AQUATIC

(See also the section "Pisces"; and Entries 10693, 10956, 11629, 11755, 11758, 11774)

10805. COLE, H. A., and E. W. KNIGHT JONES. Some observations and experiments on the setting behaviour of larvae of Ostrea edulis. Cons. Perm. Internat. Explor. Mer Jour. Conseil 14(1): 86-105. 1939.—The swimming habit of the fully developed larva resembles that of the earlier stages except that the foot is often protruded. When this comes into contact with a surface the larva may embark upon the crawling phase that always precedes setting and during which the quality of the surface is tested. It may resume swimming to seek another surface before finally selecting a spot to exude the byssus cement and settle. Metamorphosis can be delayed in the absence of a suitable surface. Expts. under semi-natural conditions in large breeding tanks show that the following factors markedly influence setting: Angle of surface—An horizontal slate caught 12,407 spat on its underside, an inclined slate (45°) 6,123, and a vertical slate 119; upper surfaces were rather more favored than vertical. Light-shaded glass plates caught, over a long period, 3 times as many spat as similar clear ones. At night this difference did not appear, by day it was still more marked. The general intensity of setting decreased at night. The intensity of setting at the surface was always high. The numbers setting near the bottom (depth 2 m.) were small, especially during the day when the larvae appeared to swim more strongly. Observations on a natural bed showed the paucity of suitable places for attachment on bottoms where old shell-cultch was abundant. Floating collectors should prove most valuable in any practical scheme of oyster culture.-Authors.

10806. ELSON, PAUL F. Order of appearance of scales in speckled trout. Jour. Fish. Res. Bd. Canada 4(4): 302-308. 2 fig. 1939.—In Salvelinus fontinalis two scale papillae develop on the lateral line over each myotome. They appear as far back as the adipose fin and independently on the dorsal line anterior to the adipose fin. The scale pattern develops by extensions obliquely forward from the primary papillae. Development is more rapid in the posterior region. Chief variations are bifurcation of rows and extension of rows posteriorly.—Auth. abst.

10807. HOOVER, EARL E. Age and growth of brook trout in northern breeder streams. Jour. Wildlife Management 3(2): 81-91. 1939.—Where the temp. of the water of a so-called breeder stream remains low at all times the trout population may be resident and of slow growth. The expectation that there will be constant emigration from such streams to tributaries for breeding often is not fulfilled. Downstream migration, if it exists, involves the larger fishes and may be a reaction against limited space in headwaters.—W. L. McAiee.

headwaters.—W. L. McAtee.

10808. MEDCOF, J. C. Larval life of the oyster (Ostrea virginica) in Bideford River. Jour. Fish. Res. Bd. Canada 4(4): 287-301. 1 fig. 1939.—Oysters spawn when ripe, with rising temps. that may or may not reach 20°C and at times not determined by lunar cycles. The growth of the larva to the ultimate size, height 365 μ , at 19, 20 and 21°C,

requires 30, 26 and 24 days respectively. The growth curves developed, not sigmoidal in shape, have been used to

predict spatfall maxima.—Auth. abst.

10809. NEEDHAM, P. R., and H. JOHN RAYNER. The experimental stream, a method for study of trout planting problems. Copeia 1939(1): 31-38. 1939.—The method by which a small stream was layed off into exptl. plots for the study of trout planting is described. Marked fish were planted in varying numbers in each plot. After completion of the fish growth expts. each plot was pumped dry and the fish removed. During the exptl. period records were kept of the aquatic food available to the fish. A discussion of the research problems arising in this type of study is given and reference is made to other types of inland aquatic problems that may be studied through the application of the exptl. stream method.—F. A. Davidson.

10810. POWERS, EDWIN B., A. RANDOLPH SHIELDS, and MARY E. HICKMAN. The mortality of fishes in Norris lake. Jour. Tennessee Acad. Sci. 14(2): 239-260. Map. 1939.—During the winter months of 1937-8, the rapid pulling down of Norris lake at the rate of approximately 0.9 feet per day and large inflows of low temp. waters from 2 tributary rivers, the Clinch and the Powell, so stirred the water of high CO₂ content in the lake with other waters that it brought about a condition of high CO₂ tension throughout the lake. The small shad, a surface and near surface fish, alternating between the surface water of lower CO₂ tension and the water below the surface of higher CO₂ tension became deranged and died. This sudden death of the fish is explained as follows: fishes have been found to tolerate a wide range of CO₂ tension in waters by increasing the alkaline reserve of their blood in waters of high CO₂ tension and decreasing their alkaline reserve in waters of low CO₂ tension. However if fishes alternate quickly between waters above a certain minimum difference in

between waters above a certain minimum difference in CO₂ tension they become deranged and die regardless of the O₂ contents of the waters.—F. A. Davidson.

10811. PRITCHARD, A. L. Homing tendency and age at maturity of pink salmon (Oncorhynchus gorbuscha) in British Columbia. Jour. Fish. Res. Bd. Canada 4(4): 233-251. 4 fig. 1939.—Pink salmon fry were marked by the removal of certain fins to ensure later identification as digital. This precedure does not effect the groupth on the adults. This procedure does not affect the growth or the feeding reactions of the fish. 3 expts. were conducted on natural runs at McClinton creek, Masset inlet, B.C. On the basis of the most significant one of these it is concluded that the majority of the fish return to spawn in the stream in which they were hatched. Isolated individuals, in numbers not economically significant, may wander to a distance of 400 miles. In the case of fry resulting from transplantation expts. from Tlell river, east coast of Graham island, to McClinton creek, there appears no consistent behavior in regard to "homing." For fry, hatchery-raised and pondreared, from Vedder river, Swelter creek eggs, no return to the parent stream was reported. All pink salmon mature in the autumn of their 2d year. Certain incidental checks in growth have been discovered on scales which should not be interpreted as representing a winter.—Auth. abst.

10812. RAE, BENNET B. Marking experiments on lemon soles at Faroe 1923-1936, with a note on Icelandic markings 1925. Cons. Perm. Internat. Explor. Mer Jour. Conseil 14(1): 35-47. 1939.—Out of 964 fish marked and liberated by the Scottish research vessel at Faroe, 217 were recaptured, all by commercial vessels. Of the total recaptured, 182 were returned within a year of liberation, 30 more within 2 yrs. and only 5 survived for longer than 2 yrs. The rate of recapture, more rapid than in Scottish waters, increased after 1930 with the increased activities in the commercial fishery. The heaviest catches of lemon soles are obtained during the summer months. A certain amount of migration takes place round the islands in an anti-clockwise or contranatant direction.-B. B. Rae.

10813. RUSSELL, F. S. On the seasonal abundance of young fish. VI. The year 1938. Jour. Marine Biol. Assoc. United Kingdom 23(2): 381-386. 1939.—This report continues the series of observations on the seasonal abundance of young fish in the plankton off Plymouth. It describes the conditions for the year 1938, in which there was a continued poverty of young fish. This scarcity is linked

with the low phosphate content of the water and the absence of rich water is indicated by a study of the Sagitta population.—F. S. Russell.

10814. SMITH, M. W. The fish population of Lake Jesse, Nova Scotia. Proc. Nova Scotian Inst. Sci. 19(4): 389-427. 1 fig. 1937/38(1939).—This study is based on a sample of fish secured after treatment of the lake with CuSO₄ (Aug. 3, 1934) to eradicate predators and competitors of speckled trout. Practically all fish came into the shores. The fish production was estimated by counting and weighing fish from measured sections of the shore-line. The estimated population was 36,035 fish, or 19.9 pounds per acre. The following spp. were present: Salvelinus fontinalis, Notemigonus crysoleucas, Semotilus atromaculatus, Catostomus commersonnii, Ameiurus nebulosus, Anguilla rostomus commersonnii, Ameiurus nebulosus, Anguilla rostoma, Fundulus diaphanus, Perca flavescens, Morone americana, Pungitius pungitius. Fundulus, Perca and Morone were the most numerous. Predator species, Perca and Morone, constituted 57% of the population. Each species is discussed separately, and data on length, weight, sex and relative condition of the fish are presented. The growth rate of Perca and Morone was slower than that determined for other lakes. Females appeared to live longer, although both sexes grew at almost the same rate. The population was dominated by fish in the 2d, 3d and 4th years of age. There were few fish of the year, indicating the dominance of predators. Fish over 4 years of age were scarce. The dominance of certain year classes suggests a cycle in the fish production, which would determine a scarcity of fry in certain years and a scarcity of older fish in others. Some species may have migrated into and out of the lake. 15,000 speckled trout fingerlings were introduced into the lake in each of the years 1929, 1931 and 1932; 29 trout were secured in 1934. A fish population, predators and competitors, as found in Lake Jesse, appears inimical to successful planting with trout fingerlings.-Auth. abst.

WILDLIFE MANAGEMENT—TERRESTRIAL

(See also the section "Aves"; and Entries 10683, 10686. 11750)

10815. BENNETT, LOGAN J. The blue-winged teal. Its ecology and management. xiv+144p. Col. frontispiece, 37 fig. Collegiate Press, Inc.: Ames, 1938.—The author studied the blue-winged teal (Querquedula discors) for 5 years (1932-37) chiefly during migration and nesting in northwest Iowa, made a survey of a considerable portion of its western breeding range in Aug., 1933, and spent 4 weeks on its wintering grounds in Mexico, 1936-'37. The book deals with the life history and ecological requirements of the species essentially from the standpoint of wildlife management but incorporates much information of broader management but incorporates much information of broader scientific interest. Local productivity appears to vary not only with nesting cover (generally grassland within a few hundred yards of marshes), rearing cover for young birds (bulrushes, etc. over the water), and relative stability of water levels at periods critical in reproduction, but also with the length of shortline in proportion to account the length of shortline in proportion to with the length of shoreline in proportion to water area. Apart from the effects of drought and drainage upon habitats, deficiencies in nesting and rearing cover signifi-cantly lower the attractiveness for blue-winged teal of many lakes and marshes still remaining in its breeding range; while both nesting and rearing cover may be lacking, often the balance between the two is unfavorable, nesting cover being adequate about open bodies of water or, conversely, rush-grown marshes surrounded to their edges by cultivated fields or closely grazed pasture. Integration of land use and conservation are stressed, and distinction is made between ill-considered drainage and exploitation of

waterfowl environment and that which may be economically or otherwise justifiable.—P. L. Errington.

10816. CHAPMAN, FLOYD B. Use of chemical sprays to increase yields of fruits utilized by wildlife. Jour. Wildlife Management 3(2): 141-143. 1939.—A survey of natural wildlife foods and factors controlling their production in control of the controlling their production in control of the controlling their production. tion in southern Ohio indicated that certain insect pests and fungus diseases, some of which attack domestic fruits also, are responsible for decreased palatability, premature abscission, decay before ripening, or complete destruction of wild fruits. The wildlife manager might profitably utilize certain chemical sprays, especially in managed refuges, in order to improve the yield and quality of certain fruits and to prolong their availability into critical periods. The use of a lead arsenate spray on 2 species of wild grapes The use of a lead atsenate spray on 2 species of who grapes (Vitis aestivalis and V. labrusca) gave excellent results in controlling the grape berry moth. Vines treated with 2 applications of a spray prepared by dissolving 4 level tablespoonfuls of Pb arsenate in one gallon of water with a soap spreader retained their fruits until midwinter when they were most useful to ruffed grouse, songbirds, and

certain mammals.—F. B. Chapman.

10817. DICKERSON, L. M. The problem of wildlife destruction by automobile traffic. Jour. Wildlife Management 3(2): 104-116. 1939.—It is suggested that an experimental approach be made to the problem of reducing the frequency of fatalities to wildlife resulting from automobile traffic. The data used include observations on roadside cover conditions associated with the presence of victims observed over a period of more than 3 years and more observed over a period of more than 12,000 miles of travel. A statistical comparison is made between data collected by the writer and similar information previously published. The frequency of dead animals is shown to be much greater on highways through plains country where only grass or low herbaceous cover is found than in other parts of the country where woody cover is more common.—L. M. Dickerson.

10818. EMLEN, JOHN T. Jr. Seasonal movements of a

low-density valley quail population. Jour. Wildlife Management 3(2): 118-130. 1939.—The movements and social relations of valley quail, Lophortyx californica vallicola, on the Univ. of California farm at Davis were followed in detail through 1937. Colored markers placed on legs and tails served to identify individuals in the field. On Jan. 1 there were 113 birds in 4 coveys. Extra-covey movements were restricted by inter-covey social barriers. During late Feb. and Mar. (mating season) yearling birds wandered extensively beyond the covey boundaries, effecting a 50% reduction in population on the winter territories. Mated pairs left the coveys for nesting early in April. Summer movements, normally restricted by nesting ties, occurred following nest failure or loss of mate. Despite early displays of social intolerance amongst broods, 4 coveys developed during the fall and half of the original birds were relocated on the territories of the preceding winter.—J. T. Emlen, Jr. 10819. ERICKSON, ARNOLD B. Beaver populations in Pine County, Minnesota. Jour. Mammal. 20(2): 195-201. 1939.—A survey of the beavers (Castor canadensis) in the County State Park Pine County, Minnesota was considered.

St. Croix State Park, Pine County, Minnesota, was carried on during June, July, and Aug. of 1936 and was completed during these months in 1937. The park, which consisted of 43.6 sq. miles in Nov. 1937, is well watered by creeks, brooks, and ponds, many of which furnish a suitable environment for beavers. The 43.6 sections of land were type mapped so that the amt., condition, and availability of aspen (*Populus tremuloides*) might be known. The condition of aspen and water, and evidence from trapping appear to warrant an estimate of 7 beavers per lodge. Since there are 824 acres of aspen (700 trees per acre) within 300 feet of water, there are 576,800 trees available for beaver food. There are about 48 miles of stream and 36 acres of pond in the park, and the beaver population is 198 animals or 245 per mile of stream and 0.95 per acres is 198 animals or 3.45 per mile of stream and 0.85 per acre of pond. There are 33 active dams and 21 active lodges and 41 inactive dams and 9 inactive lodges. The distribution of

dams and lodges is shown on a map.—A. B. Erickson.

10820. HAMERSTROM, F. N. Jr., and JAMES BLAKE.
Winter movements and winter foods of white-tailed deer in central Wisconsin. Jour. Mammal. 20(2): 206-215. 1939. in central Wisconsin. Jour. Mammal. 20(2): 206-215. 1939.

—Deer (Odocoileus virginianus) on the Central Wisconsin Game Project, Necedah (100,000 acres of sand and drained peat) were studied between Jan. 1936 and July 1938. Winter concs., instead of true yards, are formed, often in the same places year after year. Winter concs. form at a weekly average temp. of about 20° F and break up at a return to the same temp. level, but each movement has its vanguard and its laggards. Of 40 concentration areas, 14 were in jack pine. 21 in jack pine and scrub oaks, 2 in 14 were in jack pine, 21 in jack pine and scrub oaks, 2 in oak woods without conifers, and 3 in tamarack or tamarackblack spruce swamps. Small marshes and brushy swales were interspersed throughout all but the 4th type; these,

plus similar bordering zones up to 60 rods in width, were the feeding areas. Large open marshes and large aspen and willow flats were avoided in winter. Winter foods, which are discussed in some detail, were more than adequate in most of the conc. areas but were inadequate in a few. Food shortage was associated with deer density rather than with cover type. General life history notes for the other seasons are summarized.—F. N. Hamerstrom, Jr.

10821. HAMILTON, W. J. Jr., and RUSSELL P. HUNTER. Fall and winter food habits of Vermont bobcats. Jour. Wildlife Management 3(2): 99-103. 1939.—Stomachs of 140 bobcats taken in Vermont from fall to late winter over a 3-year period were examined. The results indicate that the chief food of the bobcat consists of deer (probably much of it carrion), mice (chiefly Microtus and Peromyscus), varying hares and cottontails, porcupines, squirrels, grouse, shrews, muskrats, carrion, and blue jays. Less frequent items are red and gray foxes, grass, poultry, fishes, mink, and insects.-Authors.

10822. HATFIELD, DONALD M. Winter food habits of foxes in Minnesota. Jour. Mammal. 20(2): 202-206. 1939.— Examination of stomach contents of 58 gray foxes (*Urocyon cinereoargenteus*) and 34 red foxes (*Vulpes fulva*) revealed that rodents and lagomorphs form 56.5% of the total bulk of winter food for the gray fox, and 69.2% of the bulk for the red fox. In bulk per cent, pheasants (Phasianus colchicus) comprise 6.6 for the gray and 4 for the red fox. So far as winter diet is concerned, foxes in Minnesota are more

beneficial than harmful.—D. M. Hatfield.

10823. KING, RALPH T. The essentials of a wildlife range. Jour. Forestry 36(5): 457-464. 1938.—A wildlife management program should include inventory, census, yield determination, diagnosis, and control. Inventory de-termines the spp. present and their distribution, not only of the animals to be managed but also of their food and cover plants, and competitors. Censusing relates to quanti-ties and also should be broadly inclusive; interspersion and juxtaposition of environmental elements are part of this field. Yield determinations involve the annual productivity of all factors. Diagnosis determines whether wildlife populations are, or are not, as they should be; essential steps are (1) recognition of the factors operating against the various spp., (2) evaluation of the effects of these factors, and (3) identifying limiting factors. Control measures consist for the most part of modifications of the environment. Environmental factors embrace essentials and non-essentials; the latter may be recognized but in practice ignored. Essentials are the entities: foods, coverts, and water resources, and their patterns: juxtaposition, and interspersion. Home range for any creature must contain all of the species requirements for both sexes and all age classes for all seasons and for all of the animal's activities. Even if all requirements are present, they do not constitute habitable range unless they are distributed in such a manner that every one of them occurs within the cruising radius of the animal concerned. Carrying capacity does not depend solely upon available quantities of resources but also on their interspersion so that they will serve the varying units of range as determined by specific population saturation levels. Maximum productivity can be attained only when all essentials are at optimum.—Courtesy Wildlife Review.

10824. SCOTT, THOS. G., and LYLE F. SELKO. A census of red foxes and striped skunks in Clay and Boone counties, Iowa. Jour. Wildlife Management 3(2): 92-98. 1939.—A census technique for red foxes (Vulpes regalis) and striped skunks (Mephitis m. avia) developed in Clay and Boone Counties, Iowa, is discussed. The data evidenced the following populations: Clay County, foxes 117: skunks 945: Boone County foxes 351: skunks 2331 117; skunks, 945; Boone County, foxes, 351; skunks, 2,331. The numbers of these fur-bearers appeared to vary with the acreage of land having certain slopes. Slopes under 5 to 10% and bottom lands appeared largely unattractive to breeding animals of these species.—T. G. Scott.

10825. SIMMONS, J. R. Feathers and fur on the turn-pike. 148p. 10 pl., 3 fig. Christopher Publishing House: Boston, 1939. Pr. \$1.75.—This is a natural history study over a period of ten years of the destruction of wild life on the highways of New York and New England. An

enumeration of 3,203 fatalities places robins (375) first in the list of birds with the English sparrow (351), field sparrow (296), and song sparrow (171) also well represented. Pheasants (36), considering their numbers are particularly vulnerable as compared with the bobwhite (7). Even the swift ruby-throated humming bird (1) is sometimes hit. Among mammals the cottontail (337) leads the list with the skunk (222) a close second. Immature animals form about 30% of the total. The death curve rises rapidly in July and August as the young become more abundant. The average number of casualties in 1,105 miles was 0.13 per mile. Birds come to the highway for grit and dusting. Mammals come as scavengers or for travel. Increased speed of cars is increasing the toll of wild life. The book includes a résumé of current trends in conservation and wildlife management and discusses the effects of silviculture and the training of the wildlife conservationist.—C. A. Kofoid.

10826. SPERRY, CHARLES C. Food habits of peg-leg coyotes. Jour. Mammal. 20(2): 190-194. 1939.—Comparison of the food of 161 "peg-leg" coyotes (coyotes that have lost part or all of one foot) with that of normal coyotes, based on the analyses of 8,263 stomachs. The stomachs were collected over a 7-yr. period in 17 Western States. Vegetable food forms 2% of the total food eaten in each case and includes similar items. Little variation either in nature or in volume was found in minor items of animal food. 9/10 of the total food was composed of 4 items—carrion, domestic stock, rabbits, and rodents. Peg-legs consume appreciably more carrion and domestic stock, and noticeably less rabbits and rodents, than do the normal animals.

C. C. Sperry.

10827. WHITAKER, H. L. Fox squirrel utilization of Osage orange in Kansas. Jour. Wildlife Management 3(2):
117. 1 pl. 1939.—In eastern and central Kansas the seeds of Maclura pomifera are favored food of Sciurus niger rufiventer. The large trees furnish summer nesting sites, and the hedges serve as satisfactory feeding and refuge cover. Year-round residence depends upon the presence of mature trees of large species that decay readily to make hollows suitable for winter quarters.—H. L. Whitaker.

10828. WIGHT, H. M. Field and laboratory technic in wildlife management. viii + 107p. 34 fig. University of Michigan Press: Ann Arbor, 1939. Pr. \$1.50.—This manual is used in the course in Wildlife Management in the School of Forestry and Conservation in the Univ. of Michigan and utilizes materials and environments available in the state of Michigan. It discusses the scientific method; extensive and intensive observational methods; recording notes; cover maps; census methods for birds, mammals, fish, and insects; collecting birds, large and small mammals with various types of traps; animal records and specimens, measurements, pathological material, marking, determination of age and sex, and sex ratio; preparation of bird and mammal skins; research on food habits; records of activities of animals; life histories, and matters of general technic such as animal signs in the field, identification of hair, measurement of physical and biotic factors in the environment including cover and food.—C. A. Kofoid.

ALGAE

(See also in this issue Entries 10799, 11785, 11922, 12281, 12282)

11804. HAMEL, GONTRAN. Sur la classification des Ectocarpales. Bot. Notiser 1939(1): 65-70. 1939.—The Ectocarpales, according to Kuckuck, includes 5 families: Ectocarpaceae, Myrionemataceae, Elachistaceae, Chordariaceae and Spermatochnaceae. In France the Ectocarpaceae is

represented by 11 genera, 2 of which FELDMANNIA and KUCKUCKIA, are new.—T. R. Swanback.

11805. LINDSTEDT, ALF. Über ein Fund von Gomontia polyrhiza in Süsswasser. Bot. Notiser 1939(1): 71-74.1 fig. 1939.—G. polyrhiza, a one-celled green alga, is distributed along the west coast of Sweden and Norway. The author reports finding it on an island in a lake (Ivösjön) in the province of Scania (Sweden). The lake bottom rests on a calcareous rock formation. A list of the spp. of Gomontia found in freshwater is included.—T. R. Swanback.

11806. LUND, SØREN. On Lithoderma fatiscens Are-

schoug and L. fatiscens Kuckuck. Meddelelser om Grønland 116(5): 1-16. 7 fig. 1938.—The present paper records an investigation of alcohol material of *L. fatiscens* Areschoug with plurilocular sporangia (East Greenland plants), L. fatiscens Kuckuck with plurilocular sporangia (East Greenland and Danish plants), and L. fatiscens with unilocular sporangia. Areschoug's form with plurilocular sporangia agrees in vegetative characters with Kuckuck's form with plurilocular sporangia. As in the latter, several disc-shaped chromatophores are found in each of the crustal cells (in the cells of the free filaments, however, as a rule only one chromatophore is found). In spite of this, Areschoug's form with plurilocular sporangia is assumed to differ specifically from Kuckuck's form with plurilocular sporangia, whereas its relationship to Ralfsia ovata—in accordance with the hypothesis set forth by Kolderup Rosenvinge—is considered probable. It is regarded as proved that Kuckuck's form with plurilocular sporangia and plants with unilocular sporangia belong to the same species, since in East Greenland plants terminal plurilocular sporangia and unilocular sporangia were found in the same sorus.—S. Lund.

11807. McINTEER, B. B. A check list of the algae of Kentucky. Castanea Jour. So. Appalachian Bot. Club 4 (3): 27-37. 1939.—Lists 568 forms.

11808. TAYLOR, WM. RANDOLPH. Fresh-water algae from the Paten District of Guatemala. Bot. Notiser 1939 (1): 112-124. 2 fig. 1939.—A list and classification of the algae found in plankton from lakes in Guatemala. A new species of Cosmarium guatemalense* is described.—T. R. Swanback.

11809. TIFFANY, LEWIS HANFORD. Algae, the grass of many waters. xiii+171p. 41 pl. (2 col.), 12 fig. Charles C. Thomas: Springfield, Illinois, 1938. Pr. \$3.50.— A semipopular account of the algae written for the general reader. The energy relations, assimilatory processes, growth, and life histories of algae are considered briefly in the first three chapters. Seven chapters are then devoted to the algae of lakes and ponds, of rivers and streams, of the sea, of the soil, of ice and snow, of bizarre abodes, and of past geological periods. The last 3 chapters discuss algae in relation to human welfare, how to collect algae, and how to study algae. A list of some general references to algological literature and a comprehensive index complete the book.—L. H. Tiffany.

FUNGI

Editor: C. L. SHEAR. Associate Editor: EDITH K. CASH

(See also in this issue Entries 10702, 10706, 10779, 11018, 11755, 11759, 12065, 12088, 12122, 12125, 12126, 12130, 12131, 12151, 12164, 12283)

FUNGI

11810. BESSEY, ERNST A. Isoplanogametes in Blastocladia. Mycologia 31(3): 308-309. 1939.—In the autumn of 1935 colonies of B. pringsheimii were removed from the submerged fruits of Rosa and Crataegus, upon which they had developed, and mounted in distilled water. In a few moments swarm-spores began to emerge in great numbers from the thin-walled sporangia. Soon the individual swarm-spores approached in pairs and began to fuse laterally. In one case this fusion process was observed until fusion was completed. The fate of the zygote was not observed. There were several entangled plants so that it is not known whether the fusing swarm-cells came from the same or from different plants. Smaller plants with thick-walled sporangia were present but none of these sporangia produced swarm-spores.—E. A. Bessey.

11811. BITANCOURT, A. A. Pyrenochaeta sacchari n.

sp. e uma mancha da folha da cana de açucar. [P. sacchari and a leaf spot of the sugar cane.] Arq. Inst. Biol. [São Paulo] 9: 299-302. 2 pl. 1938.—The superficial fungus is found on oval leaf spots $3-8\times1.5-3.5$ mm., chlorotic in the early stage, later vinaceous buff with a narrow Corinthian-purple border line. The pycnidia, glabrous or covered with dark setae, measure $50-100 \mu$ in diam. and contain continuous, hyaline, sub-cylindrical spores $6-12\times3$ μ .

From auth. abst.

11812. BOUGHEY, A. S. The identity of Hysterium cladophilum Lév. and H. vaccinii Carm. Trans. Brit. Mycol. Soc. 22(3/4): 239-243. 1939.—These 2 spp. united by Tehon as Bifusella vaccinii, are distinct, and neither may properly be referred to Bifusella. H. vaccinii becomes Gloniopsis vaccinii; H. cladophilum is Lophodermium c. (Lév.) Rehm. American specimens examined appear to be distinct.—G. W.

CASH, EDITH K. Some Georgia Discomycetes. 11813. Jour. Washington Acad. Sci. 29(2): 47-51. 2 fig. 1939. Notes on small, mostly folicolous Discomycetes from

Georgia, including n. spp. in Lachnum and Pyrenopeziza, and n. combs. in Lachnum, Dasyscypha, and Ionomidotis.-E. K. Cash.

11814. CASH, EDITH K. Two species of Hysteriales on Smilax. Mycologia 31(3): 289-296. 2 fig. 1939.—Hypodermopsis smilacis* (Hysterium s. Schw.), and Gloniopsis ellisii* (Hysterographium smilacis Ell. & Ev.) on Smilax spp., U. S.—E. K. Cash.

11815. CHADEFAUD, M. Le protoplasme, les vacuoles et l'ornementation des spores dans les asques de deux pézizes. Rev. Mycol. [Paris] 3(4/5): 115-128. Illus. 1938.—

Lamprospora miniata and Melastiza miniata.

11816. FAULL, J. H. A review and extension of our knowledge of Calyptospora goeppertiana Kuehn. Jour. Arnold Arboretum 20(1): 104-113. 1939.—Synonymy and literature of C. goeppertiana is given and comparison made with Peridermium ornamentale and P. holwayi which are probably distinct forms. 13 spp. of Abies have been shown as hosts of the haploid phase and 6 spp. of Vaccinium as hosts of the diploid phase, and their life histories are recorded.—A. Render.
11817. KIRSCHSTEIN, W. Zwei neue Fungi imperfecti.

Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 13(116): 54-55. 1936.—A new Phoma from Bosnia, and a new Fusarium

from Jugoslavia.-H. St. John.

11818. LINDEGREN, CARL C., VIRGINIA BEANFIELD, and ROBERTA BARBER. Increasing the fertility of Neurospora by selective inbreeding. *Bot. Gaz.* 100(3): 592-599. 1939.—Although some mutant strains of Neurospora were extremely infertile, it was possible, in 4 generations, to obtain a 10-fold increase in fertility by selecting the progeny of those matings which produced most ascospores. The development of the perithecium wall and of the ascogenous hyphae seems to be controlled by independent mechanisms.—C. C. Lindegren.

11819. LOHMAN, M. L. Karsten's type specimens of Hysteriaceae on conifers. Mycologia 31(3): 354-365. 4 fig.

1939.—Materials are described for 8 spp. A Sporidesmium is associated with Hysterium karstenii, nom. nov. (Gloniella ambigua Karst.); a Septonema with Mytilidion karstenii Sacc. (Lophium mytilinum Karst.). Two specimens are Patellariaceae.—M. L. Lohman.

11820. MARTIN, G. W. New or noteworthy fungi from Panama and Colombia. III. Mycologia 31(3): 239-249. 18 fig. 1939.—Tulasnella sphaerospora,* Jola javensis,* Stereum flabellatum * and Mycobonia flava from Panama, and Sclerocystis coccogena * from Colombia are described or the descriptions are emended or amplified.—G. W. Martin.

11821. MIX, A. J. The genus Taphrina. I. An annotated bibliography. II. A list of valid species. *Univ. Kansas Sci. Bull.* 24(9): 113-149; (10): 151-176. 1936(rec'd 6-17-38). I. A critical review is presented of the important literature on *Taphrina* (including *Ascomyces, Exoascus, Magnusiella*), from the time of Fries (1815) to the present. Many references containing merely information as to distribution of various spp. have been omitted, as well as some papers of various spp. have been of inteed, as wen as some papers of purely practical nature on disease control.—II. A list, with descriptions, is given of 104 spp. of Taphrina, which seems likely to prove valid. The recognition of a single genus Taphrina to include forms described under Ascomyces, Exoascus, Taphrina, and Magnusiella, has necessitated the actions of a form part combinators. making of a few new combinations. T. struthiopteridis Siemaszko, preoc.=T. siemaszkoi.—Auth. abst.

11822. PETCH, T. Gliocladium. Trans. Brit. Mycol. Soc. 22(3/4): 257-263. 2 fig. 1939.—General discussion of the genus, with consideration of various fungi which have been incorrectly referred to it. G. album (Preuss) comb. nov., on Myxomycetes, and G. caespitosum on Nectria, are descr.

-G. W. Martin.

11823. PILAT, ALBERT. Monographie der europäischen Polyporaceen mit besonderer Berucksichtigung ihrer Beziehungenen zur Landwirtschaft. III. Beih. Bot. Centralbl. Abt. B. 56(1/2): 1-82. 8 pl., 11 fig. 1936.—A revision of Polyporellus which in Pilat's sense corresponds almost completely with Karsten's genus of the same name and likewise with the genus Polyporus of Murrill. By Pilat's Allmitting the genus also includes Families which is delimitation the genus also includes Favolus which is considered as not generically different. Polyporellus conconsidered as not generically different. Polyporative connects the Polyporaceae with Lentinus of the Agaricaceae. A key is given for the 15 spp. listed. Most of the names here used are new name combinations; all but one of the spp. have been placed previously in the genus Polyporus; Polyporellus alveolaris heretofore has been placed in the genus Favolus. Synonymy, habitat and geographic area, distribution, and phytopathological significance are given for each sp. and critical comments are made on their classification and relationships. The variability of all spp. of the genus *Polyporellus* is considerable, perhaps the greatest among the polypores. Vars. and forms are described under spp. in which variant forms are known.—H. F.

11824. ROMAGNESI, H. A la recherche de Lactarius subdulcis. Bull. Trimestr. Soc. Mycol. France 54(3/4): 204-225. 1938.—The author finally located a specimen of L. subdulcis, which he was about to conclude did not exist, in the environs of Paris. The species commonly confused with it is L. theiogalus. An analytical key is appended, keying out 14 spp. and 2 vars., followed by complete (emend.) descriptions of 4 spp. and 2 vars.—W. A. Jenkins. 11825. SINGER, R. Studien zur Systematik der Basidiomyceten. II. Beih. Bot. Centralbl. Abt. B. 56(1/2): 157-

174. 1936.—Marasmius cyatheae brings up the yet unsolved problem of a sharp delimitation between Collybia and Marasmius. A fairly sharp separation may be made if the structure of the uppermost layer of the cuticle of the pileus is taken into consideration. The author's views are shown is taken into consideration. The author's views are snown by a conspectus of the subfamilies of the Marasmioideae. The genus MYXOCOLLYBIA is proposed for Collybia velutipes and related spp. The sections of the genus Marasmius according to the author's classification are given.—The previously described spp. of Hiatula fall in 2 heterogeneous groups of which only their habit is common: (1) Hiatula sensu Heim. et Rom., and (2) spp. with adnate sills and which apparently have no germ pore, for which gills and which apparently have no germ pore, for which

the subgenus Pseudohiatula of the genus Mycena is erected. including Mycena (Pseudohiatula) cyatheae.—Pholiota praecox, P. gibberosa, P. dura, Naucoria tuberosa, N. arvalis, and numerous exsiccatae of the semiorbicularis-pediades group were studied and the author concludes that they are closely related and form a natural group belonging in Agrocybe Fayod. A key to the European spp. of Agrocybe is given. A key to the groups of *Pholiota* is given.—The spores of *Polyporus montanus* not only resemble those of Russula in their external appearance but also their papillae are similarly colored by iodine solns. The existence of amyloid-spored Polyporaceae will probably influence the further development of the systematics of the Polyporaceae.

—H. F. Bergman.

11826. SJÖWALL, MALTE. Über Mucor rufescens Fischer. Bot. Notiser 1939(1): 265-268. 1 fig. 1939.—M. rufescens has been found only 3 times in as many places of the world. Usually occurring on horse and elephant manure, it can be isolated in single spore cultures on malt

agar. A detailed description is presented.—T. R. Swanback.

11827. SMITH, ALEXANDER H. Studies in the genus

Mycena. V. Mycologia 31(3): 267-285. 4 fig. 1939.—12 new

spp. of Mycena are described, 10 of them from Oregon and California, and 2 from Eastern U. S.-A. H. Smith.

11828. SMITH, GEORGE. Some new species of mould fungi. Trans. Brit. Mycol. Soc. 22(3/4): 252-256. 2 pl. 1939.—Mucor sexualis, Penicillium carneo-lutescens, and

P. pusillum.—G. W. Martin.

11829. ULBRICH, E. Über einige seltene Volvaria-Arten. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 13(116): 56-64. 1936.—Volvaria loweiana now found in Berlin, a detailed description, its synonymy, and occurrence; description and relationships of V. plumulosa and V. pusilla.—H. St. John.

11830. ULBRICH, E. Eine neue Battarraea-Art (B. katzlerae Ulbrich n. sp.) aus der Namibwüste in Südwestfrika und über die neue Femilie der Betterschungen.

afrika und über die neue Familie der Battarraeaceae. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 13(116): 141-150. 1936.—B. katzlerae is described from S. W. Africa. For it is described the new family BATTARRAEACEAE, a relative of the Tulostomataceae in the Basidiomycetes. H. St. John.

11831. ZUNDEL, G. L. A new smut from southern Chile. Mycologia 30(6): 679-680. 1938.—Ustilago gunnerae, on Gunnera magellanica.—Courtesy Exp. Sta. Rec.

MYXOMYCETES

11832. COOK, W. R. IVEMEY. Some observations on Sappinia pedata Dang. Trans. Brit. Mycol. Soc. 22(3/4): 302-306. 1939.—What is regarded as this species, although differing in minor respects from the description based on previous records from France and the U. S., was locally common on fresh dung in England. Nutrition is secured by digestion of bacteria and probably from materials in soln. Green flagellates were ingested but subsequently disgorged. Observations made on living amoebae and pseudoplasmodia stained with methylene blue. The amoebae are consistently binucleate; the nuclei divide simultaneously, apparently without differentiation of chromosomes, and each new cell contains 2 daughter nuclei, one from each of the original pair. The author agrees with Olive's suggestion that this organism is probably intermediate between the

Acrasiales and the true Amoebae.—G. W. Martin.

11833. GRAY, WILLIAM D. Myxomycetes of Clark
County, Indiana. II. Proc. Indiana Acad. Sci. 48: 71-73.

County, Indiana. II. Proc. Indiana Acad. Sci. 48: 71-73. 1938(1939).—39 spp. and vars. were listed in a former publication (Clark County Myxomycetes, Gray, 1936), and 27 are included in this, making a total of 61 spp. 6 spp. are reported for Indiana for the first time.—C. Groves. 11834. HAGELSTEIN, ROBERT. Notes on the Mycetozoa. III. Mycologia 31(3): 337-349. 1939.—In a collecting trip in Pike and Wayne Counties, Pennsylvania, 57 spp. of the Mycetozoa were found in one day. A later trip of about 2 weeks in Quebec through the Laurentides Naof about 2 weeks in Quebec through the Laurentides National Park as far north as Lake St. John, yielded 120 spp. and vars., many of which are rare in the eastern U. S. These rare forms with others are discussed in the later notes.—R. Hagelstein.

BRYOPHYTA

A. LEROY ANDREWS, Editor

(See also in this issue Entry 10757)

11835. ANDERSON, LEWIS E. The mosses of North V. Dicranaceae to Calymperaceae. Bryologist 42(3): 62-70. 1939.—A continuation of a check list of the mosses of N. Carolina with notes. In the present installment 12 genera are reported consisting of 28 spp. and 3 vars.—L. E. Anderson.

11836. DIXON, H. N. The east tropical dioicous species of Brachymenium (§ Orthocarpus). Brotéria Ciênc. Nat. 7(4): 180-186. 1 fig. 1938.—6 n. sp. of Brachymenium described from Africa; notes on 3 other spp. of the genus.-

E. K. Cash. 11837. FEARNSIDES, M. Graphic keys for the identification of Sphagna. New Phytol. 37(5): 409-424. 5 fig. 1938.—Four text-figs. comprise a compact series of some hundred drawings, illustrating those characters necessary for the rapid identification of *Sphagnum* samples. The drawings are in half-tone, made to scale, and realistic, being taken from typical material provided chiefly by the Växtbiologiska Institution, Uppsala, Sweden. They are arranged to be read and used as a key to the specific names within each subgenus—acting as a pocket "type collection" for the field ecologist—and dispensing with verbal keys with their accompanying language difficulties—M. Fearnsides.

11838. GIACOMINI, VALERIO. Contributo alla conoscenza della flora briologica della Sardegna. [The bryoflora of Sardinia.] Nuovo Gior. Bot. Ital. 45(4): 567-571. 1 fig. 1938(1939).—Collections made in Apr., 1936 by an expedition from the Univ. of Pavia included 4 spp. of hepatics and 29 mosses. Along highways and throughout the interior of the island pioneer mosses are spp. of Tortula, Bryum, and Funaria which are followed in succession stage by Scleropodium and Hypnum, these becoming displaced by Eurhynchium in humid and shady stations or by such lichens as Cladoma and Peltigera in exposed situations. Along the coast at Porto Conte were noted a Barbula-Pleurochaete association and a Scleropodium-Eurhynchium association.—F. Ramaley.

11839. LUISIER, A. Les mousses de l'Archipel de Madère et en général des Îles Atlantiques. Brotéria Ciênc. Nat. 7 (3): 110-131. 1 fig. 1938.—A continuation of a former paper (see B. A. vol. 12, no. 13808). Includes the families Lembophyllaceae: Isothecium and Plasteurhynchium; Echinodiaceae: Echinodium: Hookeriaceae: Daltonia, Hookeria,

Cyclodictyon, Pseudolepidopilum (type P. virens, transferred from Lepidopilum), and Tetrastichium.—E. K. Cash. 11840. LUISIER, A. Hepáticas dos Açôres. Brotéria Ciênc. Nat. 7(4): 187-189, 1938.—List of 42 spp. collected recently in the Azores, including 10 new to the Atlantic Islands.—E. K. Cash.

11841. LUISIER, A. Recherches bryologiques récentes à Madère (Troisième Série). Brotéria Ciênc. Nat. 8(1): 40-52. 1939.—Among recent collections are included 5 spp. new to the Atlantic Islands, and 1 genus (Alophozia) new to Madeira. N. spp. are described in Campylopus, Webera, and Zygodon; n. var. in Tortella.—E. K. Cash.

11842. McCONAHA, MARJORIE. Ventral surface speciali-

zations of Conocephalum conicum. Amer. Jour. Bot. 26(6): 353-355. 3 fig. 1939.—In C. conicum water absorption is limited to the ventral appendages, localized on the under side of the midrib. The area of this region is increased 380% by its scales and 5100% by its rhizoids; together 5480%. Soil contact is achieved only by the smooth-walled rhizoids which originate in areas covered by the free portion of the scales. Strands of tuberculate rhizoids under the overarching and overlapping scales constitute a complex capillary system which makes possible rapid external conduction of water along the ventral midrib.—M. McConaha.

11843. PAGAN, F. M. A preliminary list of the Hepaticae of Puerto Rico including Vieques and Mona Island. Bryologist 42(3): 71-82. 1939.—The final installment of an annotated list of 244 spp.—W. C. Steere.

11844. REIMERS, H. Über die Laubmoosgattungen

Bryoporteria Thér., Camptodontium Dus., Hymenoloma Dus., Verrucidens Card. und ihre systematische Stellung. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 13(116): 36-52. 1936.—A Bot. Gart. u. Mus. Berlin-Dahlem 13(116): 36-52. 1936.—A revision of certain mosses of southern S. America. Camptodontium cryptodon (Mont.) (=Bryoporteria chilensis Thér.); Dicranoweisia nordenskjöldii (Hymenoloma n. Dus.); Verrucidens tortifolius (Hook. f. et Wils.) (Reim.) (=V. turpis Card.); V. macrosporus Reim. (=Blindia stricta (Hook. f. et Wils.) C. M.).—H. St. John. 11845. TOYAMA, REIZO. Ishibaea et Ectropodon. Acta Phytotax. et Geobot. [In Jap.] 7(4): 264-265. 1938.—Contains I. julacea n. comb. and Anacamptodon fortunei, with synonymy and citations of specimens.—E. H. Walker.

synonymy and citations of specimens.—E. H. Walker.

11846. WALKER, R., and W. PENNINGTON. The
movements of the air pores of Preissia quadrata (Scop.).

New Phytol. 38(1): 62-68. 2 fig. 1939.—The movements of
the air-pores, previously supposed to resemble stomatal movements, are due to changes in the volume of fluid in the cell wall. This is rapidly permeable to water, and less rapidly to glycerine and various solutes. On immersion in glycerine the pore first closes and then slowly opens. The protoplasm plays no part, and the movements are shown equally well in dead material. This is contrasted with the mechanism of a stoma. Further expts. suggest that the closure of the air-pores lessens the rate of transpiration in Preissia.—W. Pennington.

PTERIDOPHYTA

C. A. WEATHERBY, Editor

(See also B. A. 13(6): Entries 10161, 10164; and in this issue 10680)

11847. BROUN, MAURICE. Index to North American ferns. 217p. Publ. by author: Orleans, Mass., 1938.—This book is a list of pteridophytes of North America (north of Mexico) arranged alphabetically by genera. Etymology and synonymy of names and the habitats and ranges of spp. are concisely given. The distr. of the spp. is so stated that the direction of its migration is indicated. A systematic outline of the N. Amer. pteridophytes, a tabulation giving the number of introduced and native spp. (also forms and vars.), an author list, and an index complete enough to include synonyms are given.—P. D. Voth (courtesy Bot.

11848. DIX, W. L. Botrychium multifidum in Pennsyl-

vania. Torreya 39(1): 13. 1939.—This fern has been found near Lake Shehawken, northeastern Pennsylvania, its only reported occurrence in that state and a southerly extension

of its usual range.—M. A. Rice.
11849. MEYER, SAMUEL LEWIS. Pteridophyta of the "Cranberry Bog," near Mountain Lake, Virginia. Claytonia 5(4): 46-48. 1 fig. 1939.—An annotated list of 17 spp. is given.—R. S. Freer.

11850. MORTON, C. V. New South American species of Dryopteris, section Glaphyropteris. Jour. Washington Acad. Sci. 28: 525-530. 1938.—A key is provided to all 11 spp. One new combination is made, 3 new spp. described from Bolivia and 1 from Peru.—C. V. Morton.

SPERMATOPHYTA

FRANCIS W. PENNELL, Editor

(See also in this issue Entries 10680, 10681, 10694, 10706, 10708, 10777, 11916, 11919, 11920, 11931, 11972, 11973, 11984, 11985, 11989, 11991, 12008, 12011, 12074)

GENERAL

11852. HOWELL, J. T. A collection of Douglas' western American plants. VII. Leaflets of Western Botany 2(10): 189-192. 1939.—Continuation of a series of notes on the collection of David Douglas' loaned from Leningrad.—L. Constance.

11853. OLIVER, ELIZABETH S. Atavistic leaf forms of various species of trees. *Bot. Gaz.* 100(3): 563-575. 23 fig. 1939.—When trees and shrubs are defoliated, the new leaves are sometimes atypical. Leaves of Populus tremuloides, Cory-lus americana, Platanus occidentalis, Tilia americana, and Ulmus americana were studied: first the normal leaf was determined, then the amt. of variation typical to the normal leaf; the atypical leaves were compared with fossil leaves (Cretaceous through Tertiary), great similarity being found, which suggests that the atypical leaves are atavistic.—E. S.

GYMNOSPERMAE

11853A. SPRAGUE, T. A., and M. L. GREEN. The botanical name of the Douglas fir. Bull. Miscell. Inform. Kew 1938(2): 79-80. 1938.—The correct name is shown to be Pseudotsuga taxifolia (Poir.) Rehder.-J. S. L. Gilmour.

ANGIOSPERMAE (MIXED)

11854. EASTWOOD, A. New Californian plants. Leaflets of Western Botany 2(10): 186-188. 1939.—New spp. and vars in Iris, Lupinus and Malvastrum, all from California.— L. Constance.

11855. MERRILL, E. D. Additional notes on Houttuyn's binomials, Jour. Arnold Arboretum 20(2): 264-268. 1939.—Additional notes to the author's paper "A critical consideration of Houttuyn's new genera and species of plants." (1938.)-A. Rehder.

11857. THOMAS, J. O., and L. J. DAVIES. Common British grasses and legumes. vii+124p. 50 fig. Longmans, Green and Co.: New York, 1938. Pr. \$2.20.—An account of selected species from a forage crop standpoint, with an elementary discussion of the morphology of the grasses and legumes, keys to common spp., botanical descriptions and good line drawings of selected spp., and a brief glossary. Also a discussion of seed selection, planting, and culture.-F. R. Fosberg.

MONOCOTYLEDONES

11858. BAILEY, L. H. Howea in cultivation. The sentry palms. Gentes Herbarum 4(10): 188-198. 8 fig. 1939.

11859. BAILEY, L. H. Species of Rhapis in cultivation. The lady palms. Gentes Herbarum 4(11): 199-208. 9 fig. 1939.

11860. BAILEY, L. H. Ptychospermate palms. Supplement. Gentes Herbarum 4(12): 209-217. 9 fig. 1939.—Notes on Actinophloeus and Ptychosperma.-R. T. Clausen.

11861. BAILEY, L. H. Lucuba palm in the new world. Gentes Herbarum 4(13): 218-219. 3 fig. 1939.—Chrysalidocarpus lucubensis reported from Puerto Rico and Brazil.— R. T. Clausen.

11862. BAILEY, L. H. Coccothrinax of Florida. Gentes Herbarum 4(14): 220-225. 3 fig. 1939.—C. argentata n. comb.—R. T. Clausen.

11863. BAILEY, L. H. Geonomas in the Lesser Antilles. Gentes Herbarum 4(15): 226-236. 10 fig. 1939.—G. dominicana* descr.—R. T. Clausen.

11864. BURRET, MAX. Palmae gesammelt in Neu Guinea von L. J. Brass. Jour. Arnold Arboretum 20(2): 187-212. 1939.—New spp. and new vars. are described of: Licuala, Livistona, Korthalsia, Calamus, Orania, Paralinospadix, Cyrtostachys, Hydriastele, Gronophyllum, Nengella and Ptychococcus. New subdivisions of two genera are proposed: Paralinospadix sect. ATOPOCARPUS and Ptychococcus subgen. STOLIDOTOCOCCUS. Notes on a number coccus subgen. STOLIDOTOCOCCUS. Notes on a number of species of other genera are given.—A. Rehder. 11865. CAMUS, AIMÉE. Un Tristachya nouveau du

Soudan méridional. Bull. Soc. Bot. France 85(7/8): 556. 1938.—T. scaettae.—E. L. Core.
11866. CAMUS, AIMÉE. Graminées récoltées en A. O. F. par M. Michel de Wailly. Bull. Soc. Bot. France 85(7/8): 603-605. 1938.—A list of 56 spp. and vars. from French West Africa.—E. L. Core.
11867. CHEVALIER, AUG. Sur la présence d'une Broméliacée spontanée en Guinée française. Bull. Soc. Bot. France 85(7/8): 489-490. 1938.—An African plant described last year by the author as representing a new genus (Will.

last year by the author as representing a new genus (Willrussellia) of Liliaceae is, in fact, a species of Pitcairnia, and becomes the first member of the Bromeliaceae to be discovered indigenous to Africa.—E. L. Core.

11868. MERRILL, E. D., and L. M. PERRY. On the Brass

collections of Pandanaceae from New Guinea. Jour. Arnold Arboretum 20(2): 139-186. 2 pl. 1939.—36 spp. of Freycinetia are enumerated, of which 25 are new. Of Pandanus, 43 spp. are enumerated, of which 16 are new, besides a new var. and a new combination. Most of the new spp. are illustrated by details of the fruit. The other spp. are accompanied by citation of literature and critical notes .- A. Rehder.

citation of literature and critical notes.—A. Rehder.

11869. NELMES, E. Notes on Carex. I. Bull. Miscell.
Inform. Kew 1937(6): 353-355. 1 fig. 1937.—A new species is described from the Malay Peninsula.—J. S. L. Gilmour.
11870. NELMES, E. Notes on Carex. II. New species from East Tropical Africa. Bull. Miscell. Inform. Kew 1937(9): 472-473. 1937.

11871. OHWI, J. Two new species of Cyperaceae from the Caroline Islands. Acta Phytotax. et Geobot. 8(1): 67-69. 1939.—Descriptions of Carex kanebirga and Frankistakis.

69. 1939.—Descriptions of Carex kanehirae and Fimbristylis hatsusimae.—E. H. Walker.

11872. SPRAGUE, T. A., and M. L. GREEN. Epipogum or Epipogium. Bull. Miscell. Inform. Kew 1937(9): 475-476. 1937.—Epipogium is shown to be correct.—J. S. L. Gilmour.

11873. UITTIEN, H. New Cyperaceae from New Guinea. Jour. Arnold Arboretum 20(2): 213-215. 1939.—New species, vars. and forms are described and new combinations made in Mapania, Capitularia and Hypolytrum.-A. Rehder.

DICOTYLEDONES

11873A. AIRY-SHAW, H. K. Pterocarpus Draco. Bull. Miscell. Inform. Kew 1937(1): 63-64. 1937.—A discussion of a case illustrating the application of the rule concerning "illegitimate names."—J. S. L. Gilmour.

11874. AKHTAR, S. A. A new species of Delphinium from Afghanistan. Bull. Miscell. Inform. Kew 1938(2): 86.

1938.

11875. ALLARD, H. A. A yellow-rayed form of Solidago bicolor on Big Cobbler Mountain, Fauquier County, Virginia. Claytonia 5(3): 28-30. 1939—The probability of confusion of yellow-rayed forms of S. bicolor with S. hispida and probable errors and inadequacies in keys of manuals and recent papers are indicated—R. S. Freer.

11876. ALLEN, CAROLINE K. Studies in Lauraceae. II. Some critical and new species of Cinnamomum and Neocinnamomum. Jour. Arnold Arboretum 20(1): 44-63. 1939.-About 25 spp. of Cinnamomum from E. Asia, India and Malaya are enumerated with citation of literature and specimens and with critical notes; 5 of the spp. are new. Also 2 new spp. of Neocinnamomum from China are described.—A. Rehder.

11877. BATHIE, H. PERRIER de la. Un nouveau genre malgache de Caesalpiniacées. Bull. Soc. Bot. France 85 (7/8): 493-496. 1938.—Description of a new genus (LEMU-ROPISUM) and species (L. edule) related to Poinciana and Colvillea .- E. L. Core.

11878. BREMEKAMP, C. E. B. New Ixora species from the Solomon Islands. Jour. Arnold Arboretum 20(2): 216-219. 1939.—Three new species of Ixora are described.—A. Rehder.

11879. BULLOCK, A. A. On the status of the name Bursera subsessiliformis Engl. Bull. Miscell. Inform. Kew 1937(6): 352-353, 1937.

11880. BULLOCK, A. A. On the identification of Rhus Filicina Sessé et Moc. Ex DC. Bull. Miscell. Inform. Kew 1937(8): 440-441. 1937

11881. BULLOCK, A. A. Notes on Mesembryanthemeae. II. The lectotypes of Nananthus and Aloinopsis. Bull.

Miscell. Inform. Kew 1938(4): 153-161. 1938.

11882. DIELS, L. Beiträge zur Flora von Papuasien. XXIV .- 141. Revision der Ericaceen von Neu-Guinea, by H. Sleumer. Bot. Jahrb. 70(1): 95-124. 1939.—The Papuan and Oceanic spp. of Agapetes and Dimorphanthera are discussed, with keys to the 15 spp. of the former and 44 spp. of the latter genus. 19 new spp. and combs. are proposed in Agapetes and 7 in Dimorphanthera.—H. N. Moldenke.

11883. DIELS, L. Beiträge zur Flora von Papuasien. XXIV.—142. Beitrag zur Kenntnis der Proteaceen Papuasiens, by H. Sleumer. Bot. Jahrb. 70(1): 125-148. 1939.— The genera Grevillea, Embothrium, Stenocarpus, Helicia, and Banksia are discussed, with 4 new spp. and combinations proposed in Grevillea, 1 new spp. in Embothrium, and 23 new spp. in Helicia.—H. N. Moldenke.

11884. FRIEDEL, JEAN. Anatomic comparée du Pteri-

dophyllum racemosum Sieb. et Zucc. et du Platysemon californicum Benth. Bull. Soc. Bot. France 85(7/8): 482-486. 3 fig. 1938.—These 2 members of the Papaveraceae are quite different: the 1st has a binary symmetry and is highly specialized; the 2d has a ternary symmetry and preserves some rather primitive characters—P. D. Strausbaugh.

11885. HOMOLLE, A. M. Les genres Tarenna, Enterospermum, Santalina (Rubiacées) à Madagascar. Bull. Soc. Bot. France 85(7/8): 605-609. 1938.—Santalina becomes a section of the genus Enterospermum, the characters of placentation being too variable in this group to justify the separation of a genus. The structure of the albumen permits separation of the genus Tarenna from Enterospermum. E. L. Core.

11886. JOHNSTON, IVAN M. New Phanerogams from Mexico. Jour. Arnold Arboretum 20(2): 234-240. 1939.—New spp. of Tidestromia, Condalia, Frankenia and Fouquiera are described and a new combination in Sarcococca made.-

11887. JOHNSTON, IVAN M. New Fuchsias from southern Peru. Jour. Arnold Arboretum 20(2): 241-244. 1939.—Four new species of Fuchsia from Peru are de-

scribed.—A. Rehder.

11888. KITAMURA, SIRO. A classification of Artemisia. Acta Phytotax. et Geobot. 8(1): 62-66. 1939.—In Japanese; concerns sections, subsections and series, several proposed as new with Latin descriptions.—E. H. Walker.

11889. KOBUSKI, CLARENCE E. New and noteworthy species of Asiatic Jasminum. Jour. Arnold Arboretum 20 (1): 64-72. 1939.—Eight new spp. and 1 new var. of Jas-

minum from China are described.—A. Rehder.

11890. KRUKOFF, B. A. Preliminary notes on Asiatic-Polynesian species of Erythrina. Jour. Arnold Arboretum 20(2): 225-233. 1939.—In connection with his work on the

American spp. of Erythrina, the author presents notes on some related spp. of Asia and Polynesia.—A. Rehder.

11891. MARQUAND, C. V. B. The Gentians of China. Bull. Miscell. Inform. Kew 1937(3): 134-180. 1937.—The generic concept adopted is equivalent to subgen. Eugentiana Kusnez. with the addition of the 2 sections Dipterospermum (C. B. Clarke) Marquand and Tripterospermum (C. B. Clarke) Marquand transferred from Crawfurdia Wall. 7 sections and 184 species are recognized. The majority are natives of the mts. of South-west China and the borders of Tibet. A key to the sections, series and species is supplied.—C. V. B. Marquand.

11892. MERRILL, E. D., and L. M. PERRY. Additional notes on Chinese Myrtaceae. Jour. Arnold Arboretum 20 (1): 102-103. 1939.—Notes on different species of Syzygium are given with a new combination and a new var. of

Baeckea is described.—A. Rehder.

11893. MERRILL, E. D. Two new species of oppositeleaved Hex from Borneo. Jour. Arnold Arboretum 20(2): 222-224. 1939.—No species with opposite leaves have been

observed before in Ilex.—A. Rehder.

11894. MUÑOZ, CARLOS. Dos especies nuevas para el norte de Chile. Jour. Arnold Arboretum 20(2): 245-249. 2 pl. 1939.—A new species Astragalus and one of Tetragonia are described and illustrated.—A. Rehder.

11895. PENNELL, FRANCIS W. Botanical results of the Archbold Expeditions; new and noteworthy Papuan Scrophulariaceae. II. Jour. Arnold Arboretum 20(1): 75-84. 1939.—New spp. are described in Adenosma and Lindernia, and critical notes given on species of Limnophila, Torenia, Artanema, Centranthera, Buchnera and Striga.—A. Rehder.

11896. St. JOHN, HAROLD. New Hawaiian species of Clermontia, including a revision of the Clermontia grandiflora group. Bernice P. Bishop Mus. Occas. Papers 15(1): 1-19. 6 pl., 1 fig. 1939.—A revision, with key. 8 spp. and 1 form are new.—E. H. Bryan, Jr.

11897. St. JOHN, HAROLD. New Hawaiian Lobeliaceae. Bernice P. Bishop Mus. Occas. Papers 15(2): 21-35. 7 pl. 1939.—New spp. or vars. are descr. in Clermontia (1), Lobelia (3 vars.), and Rollandia (2). Cyanea juddii Forbes is reduced to varietal rank under C. truncata.—E. H.

11898. Van STEENIS, C. G. G. J. New records of Styrax and Casuarina from the Solomon Islands. Jour. Arnold Arboretum 20(2): 220-221. 1939.—S. agrestis and C. suma-

trana are recorded.—A. Rehder.

11899. VIGODSKY-DE PHILIPPIS, AVIGAIL. Solenostemma argel; morfologia ed anatomia. [Morphology and anatomy of S. argel.] Nuovo Gior. Bot. Ital. 45(4): 572-585. 9 fig. 1938(1939).—This subtropical xerophytic Asclepiad of N. Africa and Palestine is a small evergreen shrub with large root having thick phelloderm, the much branched stems seldom 1 cm. in diam., green when young and be-coming pale yellow. Vascular bundles of the young stem are 4, 2 small and 2 large, with abundant external and a small amt. of internal phloem. Leaves are somewhat fleshy, with epidermis 3 or 4 layered, and few small stomata on both surfaces. The plant is one of the ecological group of ever-green sclerophylls of N. Africa, related ecologically to Rhusoxyacantha, Ziziphus lotus, and Nereum oleander .- F. Ramaley.

11900. WOODSON, R. E. Jr. New or otherwise note-worthy Apocynaceae of Tropical America. VI. Ann. Mis-souri Bot. Gard. 26(2): 95-98. 1939.—New spp. of Mande-villa from Peru and Equador; new spp. of Fernaldia and a new var. of Macrosiphonia from Mexico.—F. R. Fosberg.

FLORISTICS AND PLANT DISTRIBUTION

11901. ALLARD, H. A. Carduus acanthoides L. in Virginia. Claytonia 5(1): 10.1938.—A station for this plant, apparently not before reported for Virginia, in Shenandoah Co., is given.—R. S. Freer.

11902. ALLARD, H. A. Tragopogon dubius Scop. in Virginia. Claytonia 5(2): 13-14. 1938.—A station in

virginia. Ciaytonia 5(2): 13-14. 1938.—A station in Shenandoah Co. is given, apparently the first record for Virginia and the eastern U. S.—R. S. Freer.

11903. DANIEL, BERTHA. Notes on plants in vicinity of Falling River north of Brookneal, Campbell County, Virginia. Claytonia 5(2): 14-15. 1938.—A floristic list, including Asplenium bradleyi.—R. S. Freer.

11904. FREER, RUSKIN S. Some uncommon plants near Lynchburg, Virginia. Claytonia 5(1): 6-7. 1938.—Stations are given for II spp. which are either rare or out of their usual habitat, in Campbell, Botetourt and Bedford counties. -R. S. Freer.

11905. HUNNEWELL, F. W. Additional stations for Bouteloua curtipendula in Virginia. Claytonia 5(4): 53. 1939.—Stations in Shenandoah and Rockbridge Counties are .

reported.—R. S. Freer.

11906. Le BRUN, P., et R. ROLINIER. Contribution à l'étude de la flore du Sud-Est de la France. Observations sur la flore du Lubéron (Vaucluse). Bull. Soc. Bot. France 85(7/8): 569-574. 1938.—The Lubéron, a transitional link between the massifs of Provence and the ranges farther north, presents many analogies with the mountains of western Provence. Its flora, nevertheless, presents a character more northern than those ranges as noted by the absence or rarity of Mediterranean spp. common on the chains of the Provençal coast, by the greater abundance of Mediterraneo-Montane spp., and by the presence or greater frequency of spp. with northern affinities.—E. L. Core.

11907. LEWIS, J. B. Aesculus neglecta var. georgiana Sarg. in Brunswick county [Va.]. Claytonia 5(4): 53-54. 1939.—First record for Virginia.—R. S. Freer.

1908. LEWIS, J. B. Quercus princides Willd. in Amelia county [Var]. Claytonia 5(4): 54-55. 1939.—First record for Virginia.—R. S. Freer.

11909. MASSEY, A. B. Some new or infrequent plants of Virginia. Claytonia 5(4): 49-50. 1939.—An annotated list of 7 spp. is given. Montgomery, Nottoway, Russell and Grayson Counties are represented.—R. S. Freer.

11910. RICKER, P. L. Menyanthes trifoliata L., in

Virginia. Claytonia 5(2): 19. 1938.—An apparent first record for Virginia in Shenandoah National Park.—R. S. Freer.

11911. STEHLE, H. Notes sur la répartition et l'écologie de Monocotylédones nouvelles ou rares des Antilles françaises. 4. Bull. Soc. Bot. França 85(7/8): 505-515. 1938.— An annotated list of 22 spp. of Zingiberaceae, Orchidaceae, Burmanniaceae, and Juncaceae new or rare on the islands of Martinique and Guadeloupe.—E. L. Core.

MORPHOLOGY AND ANATOMY OF VASCULAR PLANTS

ADRIANCE S. FOSTER, Editor

(See also in this issue Entries 10678, 10680, 10731, 11899, 11993)

11912. CAPOOR, SANT PRASAD. Contribution to the morphology of some Indian Liliaceae. II. The gametophytes of Urginea indica Kunth. Beih. Bot. Centralbl. Abt. A. 56(1): 156-170. 3 pl. 1937.—The development of the anther is normal. The primary parietal layer gives rise to the endothecium, 2 middle layers and tapetum. The divisions of the microspore mother cells are successive and the resulting tetrads are isobilateral. The microspore nucleus divides to form the tube and generative nuclei, which are separated in the beginning by a thin plasma membrane. Later the generative cell becomes free and moves into the center of the pollen grain. In the nucellus there is 1 hypodermal archesporial cell (sometimes 2 were seen) which divides to form a primary wall cell and a megaspore mother cell. The position of the 2 uppermost megaspore momer so that the tetrads may be "linear," "T-shaped" or of an intermediate nature. The chalazal megaspore functions and after 3 further divisions gives rise to a normal 8-nucleate embryo sac. From the position of the spindles in the last division, it is concluded that the 2 synergids are sister cells to each other, and so are the egg and the upper polar nucleus. The diploid number of chromosomes (root tips) is 20. Some stages in the divisions of the microspore mother cells and in the 1st division of the microspore nucleus show the presence of small globular particles in the cytoplasm,

which gave a positive nuclear reaction.—Auth. summ.

11913. CHATELIER, G. GAZET du. Une technique anatomique pour l'étude des coupes épaisses. Bull. Soc. Bot. France 85(7/8): 568-569. 1938.—This technique facilitates the interpretation of thick sections, reveals presence of smaller lignified vessels, and provides improved differentiation.—P. D. Strausbaugh.

11914. CRETE, PIERRE. La polyembryonie chez le Lobelia syphilitica L. Bull. Soc. Bot. France 85(7/8): 580-583. 3 fig. 1938.—Frequently 1 and sometimes 2 embryos develop at the expense of the suspensor. This is a new and particularly clear case of polyembryony arising from a single egg, a phenomenon not often observed.—P. D. Straus-

11915. DOYLE, J., and W. J. LOOBY. Embryogeny in Saxegothaea and its relation to other podocarps. Sci. Proc. Roy. Dublin Soc. 22(11): 127-147. 4 fig. 1939.—Wall formation occurs at the 16-nucleate stage, the proembryo showing a tier of free nuclei (2-5), a tier of prosuspensors (3-5), and a group (6-10) of embryonic cells. At an early stage each of the latter becomes binucleate. This is an important criterion of podocarpean affinity. Normally, the later embryogeny is simple. During prosuspensor elongation the binucleate cells become uninucleate by membrane formation, and further divide. A secondary suspensor of long tubular cells is formed, the other cells giving a single embryo which shows an apical cell in the early stages. Exceptionally, various lobed and double embryonic cell groups occur, carried on a common secondary suspensor. This may result, rarely, in an unusual type of polyembryony. The origin of the lobing is indicated, and it is shown that the deof the lobing is indicated, and it is shown that the determinate cleavage in *Dacrydium* is related to this condition in *Saxegothaea*. This embryogeny, and also the gametophytes, are compared with those of other podocarps, and a scheme of generic relationship presented. The prototypic gametophyte and embryo are shown to have passed from the primitive podocarpean stock into at least 3 distinct lines in which subsequent modifications occurred. Simple embryony seems primitive in the podocarps, and from it two

types of polyembryony have arisen. Polyembryony is probably derivative in other conifers also.—J. Doyle.

of Natal grasses: Tricholaena Schrad. S. African Jour. Sci. 35: 250-258. 1939.—The anatomical characters of the leaves of T. repens and T. setifolia are discussed. The complex epidermis is composed of 2 alternating series of cells, those adjacent to the nerves consisting chiefly of files of short suberized and silicified elements. Ripple-walled cells, which are interrupted by stomata, occur between the nerves of the lower epidermis, but in the upper epidermis this region is occupied by motor cells and stomata. The vascular bundles are classified into 1st, 2d and 3d order bundles, and the ratio of 1st to 3d order bundles is a useful guide in distinguishing between the 2 species. Neither the margin nor the chlorenchyma shows special features.—B. S. Fisher.

11917. FOSTER, ADRIANCE S. Structure and growth of the shoot apex of Cycas revoluta. Amer. Jour. Bot. 26 (6): 372-385. 1 pl., 13 fig. 1939.—No evidence has been found, either in seedlings or adventitious buds, of the existence of a "permanent" apical cell. All cells in the apex can be traced in ultimate origin to a group of apical initials which divide anticlinally, periclinally and obliquely, without regular sequence. Two more or less clearly-defined tissue zones are differentiated in the apex viz: (1) a prominent conical zone of central tissue which is completely surrounded by (2) a mantle of deeply-stained peripheral tissue. Pronounced cell-enlargement, followed by the formation of well-defined cell groups, are the distinctive histogenetic features of the central tissue. The direction of enlargement and successive planes of division of a given central cell vary but especially at the basal region, irregular filamentous cell groups are produced which collectively resemble a rib meristem. The walls of the central cells, particularly at the corners, are often prominently thickened. Preliminary microchemical tests and examination between crossed Nicols suggest that the outer lamellae of these thickenings are composed of cellulose. The peripheral tissue zone of the apex is composed of smaller and more frequently dividing cells. The cell net and the orientation of mitotic figures indicate that centrifugal growth in thickness is characteristic of this zone. The surface cells retain a marked capacity for periclinal, anticlinal and oblique divisions; collectively they do not represent a "dermatogen." Foliar structures are initiated at the base of the shoot apex by a localized acceleration of growth and cell division in the peripheral tissuezone, which involves frequent periclinal divisions in the surface cells. Periclines are also numerous in the adaxial surface cells of the cataphyll primordia, which, at least during early ontogeny, do not possess a typical dermatogen. An anatomical comparison of the shoot apices of Cycas revoluta and Ginkgo biloba reveals few points of resemblance, and the terminal meristems of these plants are regarded as distinct "types" among living vascular plants. The closest structural resemblance with Cycas is shown by

such confers as Abies venusta.—A. S. Foster.

11918. GREGOIRE, V. La Morphogenese et l'autonomie morphologique de l'appareil floral. I. Le Carpelle. Cellule 47(3): 287-452. 14 pl., 12 fig. 1938.—The constitution and function of the floral summit, the origin of the flower from its primordial condition, and the relation between it and the sub-incent leafer axis, were childed. The these that the the sub-jacent leafy axis, were studied. The thesis that the flower is a leafy axis, the receptacle a modified stem, the floral organs modified leaves, and the stamens and carpels

sporophylls, is criticized. This study is concerned with the morphogenesis of the floral receptacle, the carpels and the vascular system of the flower, in more than 60 genera. All species were found to be uniform in the essential characters of floral morphogenesis. The floral summit does not function as a vegetative cone; it is an organ carrier which has no rôle except that of seed production, and it is not an axis bearing leaves. Moreover, from its earliest origin, the carpel is structurally different from the leaf. Its procambial tissue never develops downwards, whereas in the leaf this is characteristic. The whole ontogeny of the flower is toward a transitory structure implanted on the permanent leafy body. The flower is at first a meristem-carrier, then becomes an organ-carrier, but it is not a constituent member of the plant body. Even phylogenetically the flower cannot be considered as originating as a transformed vegetative cone. Its earliest appearance, added on to an already differentiated vegetative cone, marks the origin of the floral summit as something new and different.—H. Hibbard.

11919. GUNDERSEN, ALFRED. Flower buds and phylogeny of dicotyledons. Bull. Torrey Bot. Club 66(5): 287-295. 7 fig. 1939.—Comparison of flower buds with adult flowers in many families of dicotyledons shows that in such characters as sympetaly, zygomorphy, epigyny and others. their ontogeny confirms accepted views of phylogeny. However, flowers with parietal placentation are similar in the bud and in the adult form, while those with axile placentation usually have a beginning of parietal placentation in the bud. Groups such as Cactaceae, Cistaceae and Papaveraceae find a more natural place together early in the

system of dicotyledons.—A. Gundersen.

11920. JOSHI, A. C. Morphology of Tinospora cordifolia, with some observations on the origin of the single in-tegument, nature of synergidae, and affinities of the Menispermaceae. Amer. Jour. Bot. 26(6): 433-439. 3 fig. 1939.—The gynoecium of T. cordifolia consists of 3-6 spirally arranged carpels. When the number is more than 3, the last carpel is frequently abortive. Two ovules differentiate at first in each carpel, but later the lower is suppressed. The functional ovule is amphitropous, has only 1 integument, and is closely pressed inside the carpel. The nucellus shows an epidermal cap. The development of the embryo-sac is quite normal. The synergidae frequently show egg-like structure. The nuclei of the antipodals show a tendency toward division. The single integument appears to have resulted from the fusion of 2 in the chalazal and suppression of the inner in the micropylar part. The synergidae are of the same nature as the egg. The family Menispermaceae is more closely related to the Ranunculaceae than to the Magnoliaceae.—A. C. Joshi.

11921. LOOBY, W. J., and J. DOYLE. The ovule, gametophytes and proembryo of Saxegothaea. Sci. Proc. Roy. Dublin Soc. 22(9): 95-117. 2 pl., 5 fig. 1939.—The development of the Q gametophyte is described from the gynospore mother cell to fertilization. It is mainly formed from an upper conical zone of cells derived from early alveoli, and shows a small tentpole. The archegonia, 3 (4) in number with a 1-tiered neck, are long, large, and pointed, and originate from apical alveoli. Two sub-equal & cells are an important feature in the & gametophyte. The large egg nucleus is fertilized in the upper wide part of the archegonium, where 2 post-fertilization divisions take place, the 4 nuclei migrating to the base. Two further divisions give a proembryo of 16 nuclei from which are formed an embryonic group of cells, a zone of prosuspensors, and a tier of free nuclei. Comparisons are made with corresponding stages recorded for other podocarps. The development in Saxegothaea closely resembles that in Podocarpus, section Stachycarpus. The early origin of the epimatium in relation to ovule and scale is also described.—J. Doyle.

11922. MARVIN, JAMES W. The shape of compressed lead shot and its relation to cell shape. Amer. Jour. Bot. 26(5): 280-288. 8 fig. 1939.—Surface tension has long been considered an important factor in the determination of the shape of undifferentiated cells aggregated into tissues, and the orthic tetrakaidecahedron has been suggested as the figure which represents the fundamental shape of such cells. In an attempt to determine the effect of contact and pressure on uniform spheres, lead shot was subjected to varying

pressures, from one merely sufficient to cause a slight flattening at the points of contact to one sufficient for the elimination of all interstices. The range in the number of contacts resulting from these pressures varied from slightly more than 8 contacts for the least pressure to 14.17 contacts for the pressure at which the elimination of the interstices occurred. The average figure was very nearly 14-sided but was not the orthic tetrakaide cahedron.—J. W. Marnin

11923, MATZKE, EDWIN B. Volume-shape relationships in lead shot and their bearing on cell shapes. Amer. Jour. Bot. 26(5): 288-295. 3 fig. 1939.—Previous work of Lewis shows that cells in undifferentiated tissues have an average of 14 faces, while that of Marvin proves that in lead shot of uniform diameters, compressed so that there are no interstices, there are also approx. 14 contacts. Since cells in tissues vary in size, lead shot of 2 diams., with a ratio of 1:2—i.e., with volumes of 1:8—was mixed in varying proportions and compressed to eliminate all spaces. Under these conditions the average number of faces on the small shot was always less than 14, varying from 9.5 to 13.3, while the average number of contacts on the large shot was always greater than 14, ranging from 19.98 to 30.18. The average number of faces of all the central shot, large and small, considered together, varied from 13 to 13.8, giving fairly close approximations to the results obtained by Lewis in cells. The proportion of hexagonal and pentagonal faces, especially on the large shot, varied, depending upon the conditions of the expts. In as far as contact and pressure determine cell shapes, it is to be expected that the association of small and large cells in the same undifferentiated tissue will result in fewer than 14 faces on the smaller cells and in more than 14 contacts on the larger ones.-E. B. Matzke

11924. MOTTE, JEAN. Sur le sens anatomique des cladodes de Ruscus hypoglossum. Bull. Soc. Bot. France 85(7/8): 516-523. 2 fig. 1938.—This organ is a complex resulting from restricted coalescence of cauline and foliar elements. This confirms the first idea of the French school as set forth by Turpin, that the cladode is a cauline organ.

P. D. Strausbaugh.

11925. NOBÉCOURT. PIERRE. Sur la prolifération in vitro du parenchyme amylifère du tubercule du Solanum tuberosum L. Bull. Soc. Bot. France 85(7/8): 490-493. 1 pl. 1938.—Sterilized slices of potato placed in tubes on moist cotton produce proliferations from the cells of the starchy medullary parenchyma. When placed on a suitable synthetic nutritive medium there arise from the same tissue proliferations having a somewhat different aspect and a doubled volume.—P. D. Strausbaugh.

11926. PELLISSIER, F. Sur un mode d'étude du tissu ligneux par microinjections intravasculares et coupes. Bull. Soc. Bot. France 85(7/8): 500-501. 1938.—This involves injecting soluble dyes into the lumina of vessels by the aid of capillary micropipettes and then making serial sections.

P. D. Strausbaugh.

11927. REECE, PHILIP C. The floral anatomy of the avocado. Amer. Jour. Bot. 26(6): 429-433. 1939.—The vascular supply of the perianth of Persea americana arises as 2 distinct whorls. The perianth therefore consists of 3 sepals and 3 petals and not 6 sepals. All the stamens have 3 bundles traversing the major portion of the filament. Dichotomous branching of the lateral bundles in the filament base increases the number to 5 in members of the 3d androecium whorl. Branching of the vascular supply in the stamen is interpreted as indicating a retention of a primitive characteristic and probable reduction of the stamen from a primitive fertile branch system. Vertical compression has resulted in the fusion of the vascular supply of the main limb or rachis of this branch system to the bundles supplying the perianth.-P. C. Reece.

11928. SIEGLER, E. A., and J. J. BOWMAN. Anatomical studies of root and shoot primordia in 1-year apple roots. Jour. Agric. Res. 58(11): 795-803. 11 pl. 1939.—Observations were made on seedlings and named vars. in an attempt to relate vegetative responses with anatomical features. Limited expts. with clonal material indicate that successful propagation of apple root cuttings depends on the ability of the cutting to push roots either in advance of, or

concurrently with, shoots. Adventive shoot primordia are generally more completely organized than adventive root primordia. This probably accounts for the quick emergence of shoots in certain clons before adequate roots are developed. Adventive primordia originate in tissues that have made considerable secondary growth. In general, root primordia are initiated in close association with the vascular cambium; shoot primordia are organized as a result of activity of a small group of ray-parenchyma cells near the periphery accompanied by divisions in the posterior regions. -E. A. Siegler.

11929. SKELDING, A. D., and JOYCE WINTERBOTHAM.
The structure and development of the hydathodes of
Spartina townsendii Groves. New Phytol. 38(1): 69-79.
19 fig. 1939.—The hydathode of S. townsendii is a glandular epidermal structure of 2 cells (the basal cell and cap cell) sunk in a cylindrical depression—the well—in the epidermis of the leaf. The large basal cell is spindle-shaped, immersed in the tissue and connected by many large pits with the mesophyll and epidermis. The small dome-shaped

cap cell is an outgrowth of the basal cell and almost fills the well. Secretion of approx. ½ g. mol. NaCl soln. takes place through large pits leading from the epidermal cells into the well. The pits penetrate the thick cuticle and are closed only by a thin membrane in the region of the primary wall The glandular part of the hydathode develops from a single epidermal initial cell in the young leaf. The cuticle of the young leaf appears first as small discontinuous areas.— A. D. Skelding

11930. SOUÈGES, R. Embryogénie des cucurbitacées. Développement de l'embryon chez le Bryonia dioica Jacq.

Compt. Rend. Acad. Sci. [Paris] 208(3): 227-229. Illus. 1939.

11931. WILSON, CARL L., and THEODOR JUST. The morphology of the flower. Bot. Rev. 5(2): 97-131. 1939.—

Discussion of the morphology of the flower and its contributions to phylogeny and classification (the Amentiferae and their alliances, the Ranales, the free-central placenta of the Primulales, perigyny and epigyny), the fundamental nature of the flower, and the typological approach to the nature of the flower.—L. Benson.

AGRONOMY

Editor: CARLETON R. BALL. Associate Editors: M. A. McCALL, Crops; R. B. DEEMER, Soils

(See also in this issue Entries 10732, 10752, 10755, 10758, 10761, 10776, 10784, 10791, 11239, 11487, 11857, 11981, 11988, 11992, 12017, 12043, 12056, 12070, 12081, 12089, 12108, 12111, 12114, 12115, 12116, 12147, 12152, 12159, 12192, 12195)

CROP SCIENCE (ARVICULTURE)

11932. BEACHELL, H. M. Cereal nursery seeders. Jour. Amer. Soc. Agron. 31(3): 265-268. 7 fig. 1939.
11933. BÖGH, HENRIK. Der Einfluss der Fruchtbarkeitsverhältnisse auf die Sortenunterschiede. K. Vet. og Landbohøjskole Aarsskr. [Copenhagen] 1939: 139-184. 1939.-By grouping expts. with vars. of small cereals it is shown that the average yield of 2 vars. and the differences in yields are correlated. When yield is low the difference also is low and vice versa. In the majority of cases, differences in yield were more nearly independent of the magnitude of yield when the differences were given in percentages. Yield differences were caused largely by lodging. The nonlodging vars. are comparatively high yielding when well fertilized with N. The increase of yields in Denmark, through a series of years, is a combined effect of breeding non-lodging vars, and increased fertilizing.—H. Bögh.

11934. BROTHER, GEORGE H., and LEONARD L. McKINNEY. Protein plastics from soybean products. Ac-

tion of hardening or tanning agents on protein material. Indust. and Engineer. Chem. 30(11): 1236-1240. 2 fig. 1938. -A study of commercial soybean protein, casein, rennet and zein in the manufacture of plastics showed formaldehyde to be the best of the hardening agents studied.—M.C.Moore.

11935. BROTHER, GEORGE H., and LEONARD L. McKINNEY. Protein plastics from soybean products. Plasticization of hardened protein material. Indust. and Engineer. Chem. 31(1): 84-87. 1 fig. 1939.—A report on 70 commercially available plasticizers used with formaldehyde-hardened soybean protein.—M. C. Moore.

11936. BROWN, B. A. Fertilizers for potatoes in southern New England. Amer. Fertilizer 90(4): 9-11, 22, 24, 1939.

11937. BROWN, H. B. Cotton. 2nd ed. xiii + 592p. 1 pl., 140 fig. McGraw-Hill Book Co.: New York, 1938.

11938. BUSHNELL, JOHN. Reasons for the low average yields of potatoes in Ohio.

yields of potatoes in Ohio. Amer. Potato Jour. 16(3): 67-70. 1939.—High summer temp, leaf insects, and poor physical condition of soil, are listed as the principal factors in the

yield being below 100 bushels per acre.—J. Bushnell.
11939. CHUCKA, J. A. Potato fertilization in Aroostook
County, Maine. Ann. Rept. Vegetable Growers Assoc.
Amer. 1937: 176-184. 1937(1938).—The kind and amount of fertilizer, method of application, and maintenance of soil conditions favorable to efficient utilization of fertilizer applied, recommended for potatoes in Aroostook County, are discussed from results of station experiments.—Courtesy Exp. Sta. Rec.

11940. DECKER, R. E. Some effective aids for agronomy extension in Michigan. Jour. Amer. Soc. Agron. 31(3): 249-254. 1939.

11941. ECONOMICS BRANCH DEPT. AGRIC. S. S. [STRAIT SETTLEMENTS] and FEDERATED MALAY

[STRAIT SETTLEMENTS] and FEDERATED MALAY STATES. Padi planting methods in Malaya. Malayan Agric. Jour. 27(2): 40-59. 7 pl. 1939.—The methods of planting, water control, cultivation and tools used are described for each of the provinces.—W. D. Pierce.

11942. FUELLEMAN, R. F., and W. L. BURLISON. Pasture yields and consumption under grazing conditions. Jour. Amer. Soc. Agron. 31(5): 399-412. 1 fig. 1939.—Yields and consumption of forage from a number of grazed pastures were obtained during the seasons of 1935, 1936, and 1937. Bromus inermis consistently produced more forage per acre Bromus inermis consistently produced more forage per acre than any of the other species, and it was of high apparent palatability as indicated by consumption. *Poa pratensis* and *Dactylis glomerata* both yielded approx. the same quantities of forage, with similar percentages of consumption. *Phalamic resolution* production and the same quantities of programments and productions. tion. Phalaris arundinacea yielded slightly less than the latter but the consumption was much less. In 1935 Medicago sativa produced 9,655 lbs. of dry matter per acre; consumption was uniformly high throughout the season. Yield and consumption data were calculated from periodically clipped quadrats. Seasonal climatic factors affected yield curves uniformly for all forage spp. used in these expts.—Authors

11943. HARRISON, C. M., and C. W. HODGSON. Response of certain perennial grasses to cutting treatments.

Jour. Amer. Soc. Agron. 31(5): 418-430. 1 fig. 1939.—Orchard grass (Dactylis glomerata), timothy (Phleum pratense), quack grass (Agropyron repens), Kentucky bluegrass (Poa pratensis), smooth brome grass (Bromus inermis), and a mixture of smooth brome grass and alfalfa were grown in sand culture in the greenhouse and cut weekly at 3 heights for 8 successive weeks between Mar. 30 and May 26. In general, the shorter a given species was cut, the less total top growth and underground parts it produced. The spp. rated in the following order as regards resistance to injury sustained by frequent close clipping: Kentucky bluegrass, quack grass, smooth brome grass, with timothy and orchard grass being about equal. Smooth brome grass made better growth when grown in association with alfalfa than when grown alone.—Authors.

11944. HIXON, R. M., and A. L. BAKKE. Portable field drier. Jour. Amer. Soc. Agron. 31(3): 268-270. 2 fig. 1939.

11945. HOWARD, ALBERT. The mycorrhizal relationship in cotton production. Empire Cotton Growing Rev. 15(4): 310-311. 1938.—Surface roots of month-old cotton plants grown on soil of ordinary fertility showed dark colored areas, the darker ones coincident with mycorrhizal infection. Roots from a well manured soil showed a much higher incidence of infection.—J. F. O'Kelly.

11946. KRANTZ, F. A. Twenty-five years in the history

of the potato. Amer. Potato Jour. 16(2): 25-31, 1939.—The steps which have led to the present potato improvement work in the U. S. are reviewed. Present problems of potato breeding and the possibilities of improvement along various lines are discussed.—F. A. Krantz.

11947. KRAYBILL, H. R. Chemistry and the utilization of agricultural products. Jour. Assoc. Offic. Agric. Chem.

22(1): 37-43. 1939.

11948. MEREDITH, W. O. S., and J. ANSEL ANDER-SON. Varietal differences in barleys and malts. IV. Commonly measured properties and their correlations with nitrogen and 1000-kernel weight. Canadian Jour. Res. Sect. C, Bot. Sci. 16(12): 497-509. 1938.—Samples representing 12 vars. of barley grown at 12 widely separated exptl. stations in Canada were malted and subsequently analyzed. Varietal differences were found in steeping rate, malting loss, sprouts, extract, wort N and diastatic activity. O.A.C. 21 and Mensury, vars. which Canadian maltsters prefer, gave high values for all 6 properties. Olli, which maltsters consider promising, gave still higher values. Pontiac equalled O.A.C. 21 only in diastatic activity, and the remaining 6-rowed, rough-awned var., Peatland, which has proved less satisfactory, gave lower values for all properties, and this inferiority was more apparent when adjustments were made inferiority was more apparent when adjustments were made for its high N content. In general, the 6-rowed, smooth-awned vars., particularly Regal and Wisconsin 38, gave much lower values. However, Nobarb was only 1% lower in extract than O.A.C. 21, and Velvet equalled the latter in wort N and diastatic activity. The 2-rowed varieties, Charlottetown 80, Hannchen and Victory, were higher in extract but lower in other malt properties than O.A.C. 21. Hannchen of which considerable quantities are malted. Hannchen, of which considerable quantities are malted in the U. S. proved most similar to O.A.C. 21. Amongst the inter-varietal correlations between malt properties and N content or 1000-kernel weight of the barley, only the partial correlations for diastatic activity and 1000-kernel weight, independent of N, proved significant (r=0,609). Amongst the inter-station correlations, indicative of intra-varietal associations, those for N and extract (r=-0.957), N and diastatic activity (r=0.962), and N and wort N (r=0.764), surpassed the 1% level of significance; whereas those for N surpassed the 1% level of significance; whereas those for R and steeping time (r=-0.637), R and malting loss (r=0.694), and 1000-kernel weight and steeping time (r=0.652), surpassed the 5% level. The inter-station multiple correlation coefficient for steeping time and R and 1000-kernel weight (R=0.840) proved highly significant. The corresponding multiple correlation coefficient for extract was not significantly higher than the coefficient of correlation with

N alone.—Auth. abst.
11949. MILLAR, C. E., R. L. COOK, and J. F. DAVIS.
Fertilizers for white pea beans. Michigan Agric. Exp. Sta.
Spec. Bull. 296. 1-45. 9 fig. 1938.—Fertilizer expts. with field beans were conducted, 1921-37, on 57 farms in 18 counties in east-central Michigan. Application of 300 lb. of 4-16-4 fertilizer in bands close to but separate from the seed caused significant yield increases, often large enough to more than pay for the fertilizer. Broadcasted fertilizer resulted in no increases in yield or increases which were small and unprofitable, a condition not changed by plowing under the fertilizer. Applying 75 lb. of fertilizer with the seed did not produce increases in yield and resulted in poorer germination and stand. Advantages of fertilizers in higher yield may largely be nullified by adverse weather, especially at blooming, even though vine growth may have been increased considerably by fertilizer. Applications of fertilizer in a single band from 1.5 to 1.75 in. below the seed and in bands 1.5 in. out from the seed were the most promising of the band placement methods tested. A band on one side of the seed served as well as bands on both sides, and bands placed deeper than the seed were more satisfactory than on a level with the seed. Use of 0-16-8 fertilizer gave better results as to yield and economy than of 0-16-0 or 4-16-8, and applications exceeding 300 lb. per acre were not economical. Increases of 1 bu, or more over unfertilized plats in the same fields were made in 79.4% of the cases in which fertilizer was applied in bands under or beside the seed and in only 56.6% of the plats on which fertilizer was applied by the common or other methods. Plowing under sweet clover green manure gave good results on 2 soils in 1935, in harmony with the view that fertilizer may best be applied on the green manure preceding beans

rather than to the beans directly.—Courtesy Exp. Sta. Rec. 11950. PURVIS, E. R., and J. M. BLUME. The role of green manures in potato production. Amer. Potato Jour. 16(2): 32-36. 1939.—On a soil classed as a mixture of Norfolk and Sassafras sandy loams, the turning under of green manure crops of sorghum, soybeans, and mixtures of the 2, over a 6-yr. period, increased the average yield of potatoes 30% when compared to plats where kale or collards were grown in the fall. Analysis of yields from plats receiving similar treatment indicates that fresh organic matter is 3 times as effective in increasing yield as is residual organic matter. An average green manure crop returned

organic matter. An average green manure crop returned to the soil plant nutrients equivalent to 2000 pounds of 7-2-5 fertilizer per acre.—Authors.

11951. ROBITZSCH, J. Dreijährige Anbauversuche mit Ackerbohnensorten. [Three years' cultural expts. with field bean varieties.] Jour. Landw. 86(2): 114-126. 1938.

11952. ROSSI, U. I Tabacchi greggi italiani. [Italian tobacco types.] ii +127p. 43 pl., 4 fig. Ente Naz. Tabacco: Roma, 1937.—The plants and cured leaf of a number of important vars. of tobacco, grown more or less extensively in Italy, are illustrated in color and described with remarks in Italy, are illustrated in color and described, with remarks

on adaptation and cultural and curing requirements.— Courtesy Exp. Sta. Rec. 11953. SARIN, J. L., and M. H. QURESHI. Starch from gram. Indust. and Engineer. Chem. 30(11): 1318-1319. 5 fig. 1938.—Gram (Cicer arietinum) was studied as a commercial

1938.—Grain (Citter artesiment) was studied as a commercial source of starch.—M. C. Moore.

11954. SIEGLINGER, J. B., and J. H. MARTIN. Tillering ability of sorghum varieties. Jour. Amer. Soc. Agron.
31(6): 475-488. 1939.—The number of stalks per plant of 105 vars. of sorghum grown at Woodward, Oklahoma, for 4 to 6 yrs. is reported. Two spacings with plants about 7 in and 36 in apart in the row were used. Some vars, rarely tillered; others produced as many as 6.8 stalks per plant in one season. The average var. produced about 1.28 stalks per plant in the thick spacing and 2.39 in the thin spacing. Differences in tillering appear to account for many of the yield relationships and adaptations of the vars.—J. H. Martin.

11955. SMALLEY, H. R. The relation of fertilizer use to crop production. Commercial Fertilizer 58(3): 8-10, 1939. 11956. STEVENSON, F. J. Starch content of potatoes. Amer. Potato Jour. 15(12): 356-357. 1938.—In dry matter and starch content the Parnassia var.—a European var. reported to be high in starch production, imported for exptl. purposes—did not differ significantly from Green Mountain. and it is inferior to Green Mountain in shape of tuber and

in yield.—F. J. Stevenson.
11957. TOOLE, EBEN H., and VIVIAN KEARNS TOOLE. Germination of carpet grass seed. Jour. Amer. Soc. Agron. 31(6): 566-567. 1939.—Two samples of seed of carpet grass (Axonopus affinis) of the crop years 1934 and 1935 were tested over a period of 3 years. Germination at a daily temp. alternation of 20° to 35° C gave comparable results with or without exposure to daylight and with or without use of dilute KNO₂ soln. to moisten substratum. Other temp. alternations and all constant temps. used gave lower germination. The 1935 crop seed, received soon after harvest, maintained a good germination over the period of 3 years. The 1934 crop seed had been injured by previous storage and fell markedly in germination during the 3 years it was held in the laboratory.—Authors.

11958. YANOVSKY, E. Extraction of hemicelluloses from plant materials. Quantitative study. *Indust. and Engineer. Chem.* 31(1): 95-100. 10 fig. 1939.—Data and extraction curves (both acid and alkali) of hemicelluloses from beet pulp, rice hulls, and peanut shells were studied. Abrupt breaks in the curves of beet pulp with both acid and alkali extraction were deemed due to the presence of pectin.-M. C. Moore.

SOIL SCIENCE (EDAPHOLOGY)

11959. BURGES, A. E. Soil erosion control. Rev. ed. xvii + 221p. 73 fig. Turner E. Smith and Co.: Atlanta, Ga. 1937.—The author expresses the opinion that although much has been written concerning soil erosion, this material has usually been contributed "by those only superficially acquainted with the subject or by specialists unable to see the subject as a whole. . . . Not until now has there been available to the public any book in which this bewildering mass of data has been reduced to its essentials. This volume presents erosion control as an organized whole—a new science borrowing freely from soils, agronomy, forestry, animal husbandry, and engineering, yet being none of these. As it is developed here, soil erosion control embraces the every phase of farm management which has a bearing on the preservation of the soil."—Courtesy Exp. Sta. Rec.

11960. BURKE, R. T. AVON, S. O. PERKINS, L. J.
YOHN, O. C. LEWIS, C. H. ATKINSON, and L. A. BROWN.

Soil survey of Armstrong County, Pennsylvania. U. S. Dept. Agric. Bur. Pl. Indust. 1932(35): 1-40. Map, 1 fig.

1939.

11961. COLE, RALPH C. Soil macrostructure as affected by cultural treatments. Hilgardia 12(6): 427-472. 1939.—A method of studying the changes in the size distribution of soil aggregates caused by tillage, irrigation and seasonal changes is described. The method consists of sifting soils through two series of graded sieves. Samples for sifting were collected in a steel cylinder 14 inches in diam., with very little breaking up of the natural field structure. Plowing and harrowing normally decrease the cloddiness and the volume weight of soils. Rolling and leveling operations increase the volume weight and decrease the cloddiness of dry soils, but the cloddiness is usually increased if the soils have a moderate moisture content. Irrigation water greatly increases the cloddiness of well pulverized soils and seasonal changes may affect the size distribution of aggregates as much as any of the cultural treatments.-R. C.

11962. COMBER, N. M. An introduction to the scientific study of the soil. 3rd ed. vii + 206p. 25 fig. Edward Arnold and Co.: London, 1936.—The author has rewritten some parts of the chapters dealing with humus and with colloids and flocculation. A little has been added on the mineralogy of clay, and a paragraph on the randomized block method has been appended to the chapter dealing with field experimentation. Some additions have been made to the treat-

ment of water movement in soils.—Courtesy Exp. Sta. Rec. 11963. DAVIS, FRANKLIN L. A tool for the rapid sampling of soils. Jour. Amer. Soc. Agron. 31(3): 270. 1 fig.

1939.

GILLAM, W. SHERMAN. The geographical 11964. distribution of soil black pigment. Jour. Amer. Soc. Agron. 31(5): 371-387. 1939.—Humus was extracted from over 300 soil samples collected over an area extending from N. Dakota to Texas. The extraction was accomplished by using 4% NH₄OH and the humus content was detd. gravimetrically, the relative pigment content colorimetrically. In comparing the pigment contents of different soil types the soil samples were first reduced to a uniform textural basis equivalent to a hygroscopic coefficient of 10. For a fall of 10° C in regions of approx. equal rainfall the relative pigment content of the soil is increased 2-6 times and the organic matter and humus contents are about doubled. When organic matter content or relative humus content is plotted against mean annual temp. a sigmoidal curve is obtained. With increasing

temp. along an isohyet, a linear decrease of relative pigment content and relative humus color was noted. With increasing precipitation along an isothermal line the average soil organic matter, relative pigment content, and relative humus content increase. The graphical nature of these relationships is a curve. The relative pigment content and humus color were greatest for the chernozem soils followed by the gray-brown forest soils, the red and yellow and

laterite soils.—W. S. Gillam.

11965. GOKE, A. W., C. A. HOLLOPETER, and R. E.
PENN. Soil survey of Alfalfa County, Oklahoma. U. S.
Dept. Agric. Bur. Pl. Indust. 1933(23): 1-43. Map, 1 fig.

11966. HENKEL, J. S., A. W. BAYER, and J. R. H. COUTTS. Sub-surface erosion on a Natal midlands farm.

S. African Jour. Sci. 35: 236-243. 4 fig. 1939.

11967. JORET, G., et H. MALTERRE. Les sols de la plaine maritime picarde, Marquenterre et Bas Champs—fin. II. Ann. Agron. [Paris] 9(2): 222-252. 1939.—There are 2 main soil types in the area: (1) Low-lying—silty and high in lime, arising from fine deposits in tranquil bays, (2) Sands and gravels, originating from former sand and pebble beaches. There are many intermediate soil types. The limerich silts are, when properly handled, highly fertile, needing nitrogenous manures most. The sands and gravels are of fair to poor fertility and need organic manures most.—

R. R. McKibbin.

11968. PUFFELES, M. Effect of saline water on Mediterranean loess soils. Soil Sci. 47(6): 447-453. 1939.—The loess soils of the Beersheba area [Palestine] are highly permeable to air and water and possess good physical properties. The soils are poor in nutrients. The presence of large quantities of lime tends to preserve the stability of the natural properties of the soil and to decrease the rate of deterioration. If the very saline water that is available is used for irrigation, under favorable climatic and drainage conditions, such as obtain in this area, the salts will not accumulate, but, instead, an alkaline soil will, in time, be formed by base exchange. This soil will eventually be useless for agricultural purposes.—Auth. summ.
11969. PURI, AMAR NATH, R. C. HOON, and C.

DHAWAN. Studies in electrodialysis of soils. IV. Effect of temperature, pH value, and degree of alkalization. Soil Sci. 47(6): 479-485. 1939.—Electrodialysis of soils at different pH values and varying degrees of alkalization was studied. The rate of electrodialysis increases with the increase in pH value. The variations in the ratio of Ca/Na in the electrodialyzate of alkali soils fit in with the hypothesis that the cause of infertility in such soils lies in the deficiency of available Ca. The rate of electrodialysis reaches a maximum at about 30°C, but the effect of temp., on the

whole, is slight.—Auth. summ.

11970. ROBERTS, R. C., H. C. KNOBLAUCH, S. V.
MADISON, and V. A. HENDRICK. Soil survey of Kent and Washington Counties, Rhode Island. U. S. Dept. Agric.

Bur. Pl. Indust. 1934(9): 1-52. Map. 1 pl., 2 fig. 1939.
11971. WONSER, C. H., J. O. VEATCH, and W. J.
De BOER. Soil survey of Mason County, Michigan. U. S.
Dept. Agric. Bur. Pl. Indust. 1936(1): 1-66. Map, 2 pl., 2 fig. 1939.

HORTICULTURE

F. C. BRADFORD, Editor

(See also in this issue Entries 10694, 10695, 10728, 10729, 10732, 10733, 10746, 10755, 10776, 10816, 11767, 11928, 11947, 11949, 11958, 12018, 12052, 12094, 12095, 12096, 12097, 12108, 12114, 12138, 12143, 12145, 12153, 12166, 12168)

11972. BESANT, J. W. Gaultherias. New Flora and Silva 11(3): 211-218. 3 fig. 1939.—24 spp. are described and the more ornamental characteristics mentioned. Recom-

mendations are given concerning the better spp. to grow in English gardens where acid soil is available.—D. Wyman. 11973. BOWLES, E. A. Colchicums. New Flora and Silva 11(3): 185-195. 3 fig. 1939.—A discussion of Colchicum spp. and vars. as they are used in English gardens.—D.

11974. BUGINI, F. Partenocarpia e apogamia nelle piante arboree da frutto. [Parthenocarpy and apogamy

in tree fruits.] [With Eng. summ.] Riv. Frutticultura (Ravenna) 2(3): 182-200. Illus. 1938.

CABRAL VASCOCELLES, đe PHILLIPE WESTIN. [An experiment with green manuring in vine-yards.] Jor. Agron. [São Paulo] 1(2): 133-137. 7 fig. 1938.— The need of a leguminous cover crop in Brazilian vineyards to prevent the loss of plant food and to supply humus is discussed. Medicago lupulina seems to fill the requirements. It is adapted to a wide range of conditions, does not climb, and is easily cut and turned under. Its period of growth does not conflict with that of the grape and it adds fertility to the soil. It reseeds itself each year and the seed

are easily harvested.—W. C. Johnstone.

11976. HALL, E. R. The pollination of the sweet cherry on Vancouver Island, British Columbia. Sci. Agric. [Ottawa] 19(8): 524-530. 1939.—While all vars. of sweet cherries (Prunus avium) worked with produced an abundance of pollen, all were self-sterile. Sufficient overlapping occurred in the blooming periods of most vars. to insure a supply of viable pollen while the stigmatic surfaces were yet receptive. Bing, Napoleon (Royal Ann) and Lambert are inter-incompatible. Deacon proved to be an excellent pollinating var. giving satisfactory commercial sets on Bing. Early Rivers, Lambert, Pelissier and Napoleon (Royal Ann).—E. R. Hall.

11977. HAY, ROY. Annuals for 1939. New Flora and Silva 11(2): 96-99. 1939.—The author has taken into consideration the merits of annuals both in America and in Europe and offers the following as being the outstanding for the year: "Scarlet Empress" Nasturtium—a dwarf; Cynoglossum amabile "Firmament"; Dianthus "Gaiety" which contains red, rose, purple and crimson in an infinite number of shades; Cornflower "Lilac Lady"; Hollyhock "Indian Spring"—deep carmine-red; Salvia "Damask Rose"; Ipomoea "Scarlet O'Hara" (cornelian-red flowers); Alyssum "Violet Queen"; Sweet Pea vars. "Lilac Gown," "Illumination," "Modesty" and "Lady Satin Rose"; Primula "Peter Pan"; Papaver pilosum "Double Orange."—D.

Wyman.

11977A. HESSE, C. O., and C. W. HITZ. Maturity studies with Jonathan and Grimes Golden apples. Proc. Amer. Soc. Hort. Sci. 36: 351-357. 1938(1939).—Four years' expts. in attempting to show maturity indices of Grimes Golden and Jonathan apples have revealed no satisfactory indices for Grimes and only promising indices for Jonathan. A qualitative starch test based on pre-determined stages of starch loss substantiated the idea gained from quantitative analysis that starch loss might be a measure of maturity in Jonathan. Neither ground color nor blush was found to be an index of storage quality, but Jonathan should have 40% blush before proper palatability was obtained. The pressure test, the electric maturity test, the "index number" test were all found unsatisfactory.—C. W. Hitz.

11978. JAGOE, R. B. The effect of lalang grass (Imperata arundinacea) on growth of coconut palms. Malayan Agric. Jour. 26(9): 369-375. 2 pl. 1938.—Field expts. confirmed the widely-held view that unchecked growth of lalang is injurious to coconut palms. The poor development of the palms is probably due to a limited uptake of nitrates by reason of the restricted development of the surface feed-

ing roots.-W. D. Pierce.

11979. LANUZA, EPITACIO A. The Pili nut in the Bicol region. Philippine Jour. Agric. 10(1): 21-31. 4 pl.

11980. LANUZA, EPITACIO A. The cacao industry in the Philippines. Philippine Jour. Agric. 10(1): 69-75. 1939.

11981. LAURIE, ALEX, and ARNOLD WAGNER. Gravel culture of flowering crops in the greenhouse. Ohio Agric. Exp. Sta. Bimo. Bull. 24(198): 47-52. 3 fig. 1939.—The automatic subirrigation system of nutrient soln. culture is described. Information concerning media, solns., and chemicals is given. The best soln. is the 2 WP soln. which cals is given. The best soin, is the 2 WF soin, which consists of the following chemicals added to 1,000 gallons of water: KNO₃, 2,632 g.; (NH₂)₂SO₄, 439 g.; MgSO₄, 7H₂O₅, 2,043 g.; CaH₄(PO₄)₂, H₂O₅, 1,090 g.; and CaSO₄, 2H₂O₅, 4,856 g. The nutrient levels are as follows: nitrates 1,000 4,856 g. The nutrient levels are as follows: nitrates 1,000 p.p.m., P 400 p.p.m., K 500 p.p.m., Ca 600 p.p.m., and Mg 100 p.p.m. Difficulties which one is apt to experience with the system are discussed and remedies suggested. Production records are given for roses and chrysanthemums.-Authors.

11982. LLOYD, J. W., and J. P. McCOLLUM. Yields of asparagus as affected by severe cutting of young plantation. Illinois Agric. Exp. Sta. Bull. 448. 157-172. 5 fig. 1938.— This 2d report on a plantation of Mary Washington asparagus set in 1926 deals chiefly with yields secured during the 1931-37 period, during which all plats were cut for 8 weeks each season. 6 treatments, in which the time of initiating cutting and the duration of the cutting periods were varied in the early years, were compared. Total weights for the 7 yrs. showed the detrimental effects of medium and heavy cutting during the initial year. Light cutting the 2d year (2 weeks) was apparently beneficial, this being the most productive treatment. Medium cutting (4 weeks) the 2d year resulted in lower yields than where the cutting was delayed until the 3d year. On the whole, deferring all cutting until the 3d year after setting is conceded a safe procedure but may result in smaller total yields over a period of yrs. than would light cutting the 2d year followed by moderate cutting the 3d year. Cutting for 8 weeks each year after the 4th gave good results. Cutting asparagus the 1st year after setting, even for a period of 2 weeks, is not deemed advisable.—Courtesy Exp. Sta. Rec.

11982A. MEADER, E. M., and M. A. BLAKE. Some lant characteristics of the progeny of Prunus persica and Prunus kansuensis crosses. Proc. Amer. Soc. Hort. Sci. 36: 287-291. 6 fig. 1938(1939).—A detailed description of P. kansuensis is given with mention of tree, flower, and fruit characteristics. Crosses of a pink-flowered and a white-flowered type with J. H. Hale gave a vigorous F₁ population that resembled the kansuensis parent in tree characteristics and early blooming habit, but the persica parent in type of flowers. The fruit of F₁ seedlings was small, medium in pubescence, white-fleshed freestones with red about the pit, and acid and astringent flesh.—E. M. Meader.

11983. MILSUM, J. N. Garcinia atroviridis or Asam gelugor. Malayan Agric. Jour. 26(5): 181-185. 5 pl. 1938.—
The unripe fruit of this Malayan tree, when sliced and dried, forms a sour relish extensively sold in Malaya for use in curries. The characteristics of the plant are described. The flowers are unisexual. Propagation has only been practised from seed. A mature tree may produce several hundred fruits. Both fruit and leaves are used medicinally. The preparation of the dried product is described.—W. D.

11984. ROSENHEIM, P. The genus Helleborus. New Flora and Silva 11(2): 74-85. 1939.—Cultural and propagation notes are briefly given for the entire genus. 22 spp. are described and notes of horticultural significance are given concerning each species together with the general habitat of each.—D. Wyman.

11985. ROWNTREE, LESTER. Asters and Erigerons of California. New Flora and Silva 11(3): 151-164. 2 fig. 1939.

—Over 20 asters and 35 Erigerons are native of California. The outstanding species horticulturally of both genera are discussed, habitat given, flowers and general plant characters described and directions given for their best culture in

California gardens.—D. Wyman.
11986. SINDEN, J. W. Synthetic compost for mushroom growing. Pennsylvania Agric. Exp. Sta. Bull. 365. 1-27. 2 fig. 1938.—A synthetic compost composed of wheat straw, urea. and wheat produced 444 lb. of mushrooms per ton of straw, or nearly the same as horse manure. Addition of wheat to the compost produced more rapid decomposition and larger yields. Rate of decomposition increased as urea was increased up to 32 lb. per ton of straw. Beyond this point, rate of decomposition declined. Yields of mushrooms from synthetic composts per ton of straw and also per square foot of bed decreased as the amount of decomposition increased, due, apparently, to a loss in organic matter. The procedure for making synthetic compost is discussed. Courtesy Exp. Sta. Rec.

11987. SMOCK, R. M., and A. Van DOREN. Preliminary studies on the gas storage of McIntosh and Northwestern Greening. Ice and Refrig. 95(2): 127, 128. 1 fig. 1938.— Using uniformly mature fruits stored in air-tight metal containers large enough to hold at least 1 bu., the modification of the storage atmosphere to contain 5% CO2 and 2½% O₂ was beneficial to the keeping of both vars. With gas storage, a temp. of 40° F proved more satisfactory than 36° in preventing the development of brown core.—Courtesu

Exp. Sta. Rec.

11988. STEELE, T. A. Erosion control practices in orchards. Ann. Meet. Western Nut Growers' Assoc. 23: 170-179. 1937(1938).—Annual cover crops. mulching, contour or cross slope cultural practices and subsoiling aid materially in reducing soil losses through erosion on gentle to moderate slopes; on steeper slopes these measures must be supplemented with terraces, contour furrows or diversion ditches, or a permanent vegetative cover must be grown. Cover cropping is one of the most widely used measures employed to combat erosion and to maintain soil productivity, although the other above-mentioned practices are being widely adopted. Vetch, Australian peas, and grain, sown alone or in combination, are the common cover crops used. Heavy green-manure tonnage and less soil washing occur if seedings are made in early Sept., which, in normal years, provides a vigorous root system and top growth, before cold weather. Depleted fertility and shade from closely planted trees make cover crops hard to establish. Commercial fertilizers or a light application of straw following seeding will help to remedy this situation, or it may be necessary to resort to mulching alone for a few years until soil conditions are made favorable for cover crop growth. Terraces, etc., combined with other soil conservation practices permit the use of sloping soils without loss of top soil. They break up long slopes into small individual ones, thereby preventing accumulation of large amts. of water. A terrace, furrow, or diversion ditch carries the surplus water accumulated between them from the orchard, retaining within the terrace channel the silt which otherwise would be lost. Steepness of slope and soil type will have a bearing upon the frequency of terraces. Terrace outlets are an important part of the terrace system and need to be properly constructed and seeded to prevent washing. Outlets should empty into wooded area, pasture land or natural water channel.—W. P. Duruz.

11989. STOKER, FRED. Hardy Pernettyas in cultivation. New Flora and Silva 11(3): 165-174. 1939.—Except for a native of Mexico and Central America, all known spp. belong to S. America, New Zealand and Tasmania, the greater proportion being S. American plants. 13 ornamental spp. are discussed, their ornamental characters mentioned and suggestions given for their best use in the garden. —D. Wyman.

11990. TANAKA, TYÖZABURÖ. A new method in mango propagation. Philippine Jour. Agric. 10(1): 1-7. 5 pl. 1939.—The new device for side-grafting reported in this paper, in which immature wood is used, has been found very satisfactory under tropical conditions in multiplying mango plants (Mangifera indica L.) in a very speedy way.—M. Manresa.

11991. THIMANN, KENNETH V., and ALBERT L. DELISLE. The vegetative propagation of difficult plants. Jour. Arnold Arboretum 20(1): 116-136. 4 pl. 1939.—The different factors which influence the rooting of cuttings of conifers and dicotyledonous trees are discussed; the most important are the age of the tree, auxin treatment, the part of the tree from which the cuttings are taken, and treatment with sugar and vitamin B. The 10 tables and the plates show the results of the expts. A bibliography concludes the paper.—A. Rehder.

11992. THOMPSON, ROSS C. Influence of various factors on the shape of beet roots. Jour. Agric. Res. 58(10): 733-745. 1939.—Variations in shape of beet roots due to various factors were studied by means of 3 numerical indices. The shape indices varied with size of roots, soil texture, and seasonal conditions as determined by dates of planting and harvesting. Variation in fertility level failed to give significant changes in shape. In genetically pure strains of beets variation in shape due to environment is not great except under wide extremes of soil texture and seasonal conditions.—R. C. Thompson.

study of the prefilling period of fruit development in the pecan. Jour. Agric. Res. 58(12): 905-910. 1939.—Analyses of pecan nuts at frequent intervals after pollination showed that the development of the shell was completed during the prefilling period. The shell developed rapidly during August, showing complete hardening during the first 3 weeks of that month. This development was accompanied by a rapid increase in acid-hydrolyzable polysaccharides and dry matter and a decrease in total sugars. The shuck development also was completed during the prefilling period, except for an increase in ash content and slight changes in the total sugars and acid-hydrolyzable polysaccharides. The prefilling period extends from date of blossoming to the beginning of oil formation in the kernel.—C. L. Smith.

11994. TORRES, JUAN P. Some notes on tongue-inarching of the avocado. Philippine Jour. Agric. 10(1): 11-17. 8 pl., 2 fig. 1939.—The tongue-inarching method of vegetative propagation of plants, otherwise known as "whip grafting" or "grafting by approach," is superior to the ordinary method not only with avocado plants but also for chico, lanzon, sweet guayabano, atemoya, biriba and seedless mabolo.—M. Manresa.

11995. UPSHALL, W. H. Investigations on transplanting fruit trees. Sci. Agric. [Ottawa] 19(8): 510-523. 1939.—For 5 consecutive yrs., 1932-1937, time-of-planting and supplementary tests with apple, pear, plum, cherry and peach trees were carried on at the Ontario Horticultural Expt. Station. Fall planting, mid-Oct. to mid-Dec., was as satisfactory as the very early spring planting, mid-Apr., and both were decidedly better than the late spring planting, early May, which is common in this district. Peaches were an exception; fall-planted trees showed heavy casualties, mainly as a result of canker infections at wounds. New roots were usually initiated on fall-planted trees before the onset of winter and these continued growth again in the spring before the soil was dry enough for planting. Fruit trees planted in the fall lost 7-10% of their weight by mid-Apr. About this time all trees but pear began to gain and by May 20 plum and cherry trees had passed their original weight. Heavy pruning of the tops of the trees reduced new root growth in the early part of the season but complete disbudding did not do so. Pruning away the ends of the roots of trees which had been heeled in over winter reduced the growth of the tops for that season.—W. H. Upshall.

11995A. WEEKS, WALTER, and L. P. LATIMER. Incompatibility of Early McIntosh and Cortland apples. Proc. Amer. Soc. Hort. Sci. 36: 284-286. 1938(1939).—Cortland and Early McIntosh, although diploid vars., set few fruits when pollinated one by the other. Both are also self-incompatible. These vars., however, make good pollenizers for other vars. and are easily pollenized by vars. known to produce viable pollen. Sections of pistils and ovaries of Early McIntosh blossoms pollinated by Cortland and vice versa stained with acid fuchsin showed that crossincompatibility was due to cessation of pollen-tube growth about ½ the distance down the style. The tips of the pollen tubes became swollen or club shaped at this point although previous to this the tubes had grown at about the same rate as pollen tubes of compatible pollen. When self-pollinated, pollen tubes progressed about ½ the way down the style before growth ceased. Cortland and Early McIntosh probably carry the same incompatibility factors.—L. P. Latimer.

FORESTRY

W. N. SPARHAWK, Editor

(See also the section "Economic Entomology—Forest and Shade Trees"; and Entries 10753, 10778, 10785, 10786, 11770, 11856, 11958, 11959, 11988, 12120, 12125, 12153, 12166, 12168)

11996. BALME, JUAN. Quelques notes sur un arbre fruitier mexicain, le Crataegus mexicana Moç. et Sesse, dont la culture serait interessante, tant en France qu'aux Celonies. Bull. Soc. Bot. France 85(7/8): 501-502. 1938.—Introduction of this species into many new regions is recom-

mended because of its hardiness and economic worth. The fruit is abundant, excellent, and is used medicinally as a cough remedy. Decoction of the roots is an excellent diuretic, and the wood is used in making tool handles.—
P. D. Strausbaugh.

11997. BERTRAND, G., et G. BROOKS. Sur le pouvoir calorifique des bois et des tissus lignifiés. Ann. Agron. [Paris] 9(2): 209-221. 1939.—Following Mahler's procedure, and expressing "calorific power" in gram-calories, most of the common woods and lignified fibers were burned in a bomb calorimeter. Trunk woods generally gave higher values than branches. Woods, dry, varied from 4061 for trunk wood of aspen to 4927 for that of hornbeam. Cocoa fiber was 5319, raffia 5442, oat straw 4208, with other straws, fibers, etc., lying between these values.—R. R. McKibbin. 11998. BEVERSLUIS, J. R. Boschbouwkundige gegevens

omtrent houtsoorten. [Silvicultural data on trees.] Nederland. Boschbouw-Tijdschr. 12(3): 112-115. 1939.—Silvical

characteristics, management, and yields of Fraxinus excelsior.

11999. B[IRCH], T. C. Pinus radiata cuttings. New
Zealand Jour. Forest. 4(3): 192-193. 1938.—A plantation of 640 Pinus radiata cuttings was established in 1930. At the end of 1937 the ave. diam. of the trees was 6.76 inches (max. 9.2 inches) and the ave. height 31 feet.-W. N. Sparhawk.

12000. BURGERS, P. H. Iets over den groei van Eucalyptus globulus. [Growth of Eucalyptus globulus.] Nederland. Boschbouw-Tijdschr. 12(3): 109-111. 1939.—A 12-yr. old sprout stand of E. globulus in southern Spain, without any cultural measures, produced 300 cu.m. of wood.—W. N.

Sparhawk.

12001. DE, R. N. Effect of grass on teak seedlings. Indian Forester 64(9): 563-564. 1938.—As noticed in the Goalpara division (Assam), the rate of growth of sal seedlings was slower in grassy areas (mostly under *Imperata*) than in clear-felled tree forests with other weeds.—J. N.

12002. DELEVOY, G. En Finlande. Bull. Soc. Centr. Forest. Belgique 46(4): 137-163. 2 pl. 1939.—Description of the forests and forestry activities in Finland.-W. N.

Sparhawk.

12003. GIORDANO, GUGLIELMO. Un sguardo d'insieme alle foreste dell' Impero. [Forests of the Empire.] Riv. Forest. Ital. 1(1): 45-48. 4 fig. 1939.—A brief general description of the forests of Abyssinia.—W. N. Sparhawk. 12004. HODGE, W. E. History of the mal block of the Kalimpong division. Indian Forester 64(9): 583-589. 1938.—

Describes how this block, which is a poor type of forest, could, under systematic management, improve vastly towards establishing promising crop of important spp.— J. N. Sen Gupta.

12005. LAURIE, M. V. Germination of nim seeds (Azadirachta indica). Indian Forester 64(8): 500. 1938.—Abundant germination of nim (A. indica) has always been obtained in one range in Madras by using white seed collected from beneath Ficus and other trees on which crows were wont to sit and eat the seeds.—J. N. Sen Gupta.

12006. LIMAYE, V. D. Wood for sports goods. Indian Forester 64(8): 482-485. 1938.—A note on the Indian timbers that are being used at present, or that could be

utilized, in this field.

12007. MERENDI, ARIBERTO. Le cure colturali ai boschi nuovo impianto. [Cultural care of recently planted forests.] Riv. Forest. Ital. 1(1): 31-35. 4 fig. 1939.
12008. MILLER, D. Chiefly on Chilean forests. New Zealand Jour. Forest. 4(3): 161-172. 2 maps. 1938.—Notes

on the distrib. and composition of the forests, the native fauna, and various dye plants.—W. N. Sparhawk.

12009. MOHAN, N. P. Twisted fibre in Pinus excelsa.

Indian Forester 64(8): 501. 1938.—Although twisted fiber is well known in P. longifolia, P. excelsa and deodar are also not immune from it, as noticed in some timber depots of the Punjab.—J. N. Sen Gupta.

12010. MOORHOUSE, R. B. A preliminary trial of the sodium biselenite method of seed germination testing. New Zealand Jour. Forest. 4(3): 187-189. 1938.—The NaHSeO₃ method of seed testing (developed by Erdmann and Hasegawa) was compared with soil and cutting tests on seed of 5 pine spp. Results were inconsistent and inconclusive.— W. N. Sparhawk.

12011. SACCARDY, L. Le Chêne-liège et le liège en Algérie. I-IV. [Cork-oak and cork in Algeria.] Rev. Bot. Appl. 18(203): 488-497; (204/205): 574-593. Map. 1938.

12012. SCHWARZ, HANS. Standortliche Bewertung der forstlich wichtigeren Bäume und Sträucher in der Ostmark. Oesterreich. Vierteljahresschr. Forstwesen 88(4): 241-246. 1938.—The native trees and larger shrubs of Austria and foreign spp. planted in Austria are classified according to the climatic or altitudinal zones in which they thrive .-W. N. Sparhawk.

12013. SINGH, B. J. Nim. Indian Forester 64(12): 748. 1938.—Seed collected from under nim trees (Azadirachta indica) and not from beneath Ficus or other trees has consistently given good results in regeneration.—J. N.

Sen Gupta.

12014. SISSINGH, G. Het exotenvraagstuk en de plantensociologie, speciaal met het oog op Nederlandsche boschgezelschappen en hun vicarieerende associaties in Amerika. [Cultivation of exotics and plant sociology, with special reference to forest associations in the Netherlands and their corresponding associations in America.] Nederland. Bosch-bouw-Tijdschr. 12(4): 145-165. 1939.—Exotics are classed in 3 groups: those absent from a given country or region for climatic reasons (climatic exotics); those absent because not adapted to the given soil conditions (edaphic exotics); and those adapted to climate and soil but absent because of vegetational and geological history (vicarious exotics). Only the 3d group is worth considering for planting in the Netherlands. Study of the floristic composition of N. American forest types, in comparison with the European types having the same spp. and genera, forms the basis for conclusion as to what sites in Europe are suitable for growing American spp. It is concluded that Acer saccharum, Fraxinus amerispp. It is concluded that Acer saccharum, Fraxinus americana, Tilia glabra, Ulmus americana, Prunus americana, Pruse serotina, Quercus boreaks, and Liriodendron tulipifera may be grown in the Querceto-Carpinetum type in the Netherlands; and Q. montana, Q. velutina, Castanea dentata, Betula lenta, and Pinus rigida in the Querceto-Betuletum type. Picea canadensis, P. engelmanni, Abies lasiocarpa, A. grandis, Pinus murrayana, P. banksiana, P. strobus, and P. resinosa are not recommended; even European conifers are not native and should be used with caution. The suitability of Pseudotsuga taxifolia is doubtful.—W. N. Sparhawk.

12015. VAGI, ISTVAN. A Duna és Tisza közötti meszes futohomoktalajok könnyen feluhető foszforsovtartalma az ákácfásitás szempontjaból. [The accessible phosphoric acid content of calcareous drift sands of the Danube-Tisza low-land, in relation to planting of black locust.] [With Ger., Fr., and Eng. summ.] $Erd\acute{e}szeti$ Lapok 78(4): 373-382. 1939.—The methods generally employed for ascertaining P_2O_6 content do not show definitely whether or not certain soils are good for Robinia pseudoacacia.—W. N. Sparhawk.

PHARMACOGNOSY AND PHARMACEUTICAL BOTANY

HEBER W. YOUNGKEN, Editor

(See also in this issue Entries 10678, 11748, 11979, 11984, 11996, 12011, 12112, 12223, 12235)

12016. ADRIAENS, L. Le ricin au Congo Belge. Étude

12016. ADRIAENS, L. Le ricin au Congo Beige. Etude chimique des graines, des huiles et des sous-produits. Mém. Inst. Roy. Colon. Belge Sect. Sci. Nat. et Méd. Col. in 8° 5(5): 1-206. Folding map, 12 pl. (2 col.) 1938.

12017. ANDREADIS, TH., und E. TOOLE. Über die Verteilung des Nicotins in der Tabakpflanze. Zeitschr. Untersuch. Lebensmittel 77(3): 262-272. 1939.—The nicotine conc. is greater in the upper leaves of the plants than in the

lower leaves. The nicotine conc. is highest at the periphery and lowest in the veins of the leaf. It is in general highest in the ripest parts of the plant. It can be 5.4% in the center of a yellow spot of a leaf and only 3.6% in the green

region around that yellow spot.—M. Kleiber.
12018. ARTZ, LENA. Wild beverage plants. Claytonia 5(1): 1-4. 1938.—The uses of a number of plants for beverage purposes, from colonial times to the present, are given,

with anecdotes and historical references relating to some of the early American botanists.—R. S. Freer.

12019. FEIST, K., und W. VOELKSEN. Über die Bitterstoffe der Colombowurzel [Jateorrhiza palmata]. VI. Justus Liebigs Ann. Chem. 534(1): 41-56. 1938.—While pure columbine, isocolumbine (which is formed from columbine under the influence of alkali) and decarboxy-columbine (into which columbine decomposes on heating under liberation of CO₂) do not give off acetone on fusing with potash, palmarine and chasmanthine yield acetone. The 2 latter ones probably contain a completely formed hydronaphthalene ring system. On hydration of decarboxy-iso-columbine octahydro-decarboxy-columbic acid is formed which can be used for the formation of the methyl ester. Columbine, chasmanthine and its abbau acid (merochasmanthic acid) yield in the zinc dust distillation (according to Kögl and Hansgirg) 1,2,5-trimethyl-naphthalene and o-cresol. Especially remarkable is the behavior of chasmanthine and columbine towards NH₄OH: chasmanthine is transformed into the isomeric palmarine, while the change of columbine into iso-

columbine can only be achieved with alkali.—M. Neuhof. 12020. FOLKERS, KARL, and FRANK KONIUSZY. Erythrina alkaloids. III. Isolation and characterization of a new alkaloid, erythramine. Jour. Amer. Chem. Soc. 61(5): 1232-1235. 1939.—A new alkaloid, erythramine, having curare-like properties was isolated from the seeds of Erythrina sandwicensis and E. subumbrans.—H. N. Glass-

man.

12021. FURRY, MARGARET S. Breaking strength, elongation, and folding endurance of films of starches and gelatin used in textile sizing. U. S. Dept. Agric. Tech. Bull. 674. 1-36. 1 fig. 1939.—The physical properties of breaking strength, total elongation, and folding endurance were measured on films made from wheat, dasheen, corn, rice. sweet potato, canna, and potato starches and from gelatin used alone and in combination with borax, glycerin, soap, and sulphonated castor oil. Films sized with cornstarchand gelatin-sizing mixtures were tested for stiffness, breaking strength, and total elongation, and the relation of these fabric properties to those of the starch films was studied. It was found that the breaking strength of films of the 7 starches depended on their thickness, increasing as the thickness increased. Borax and glycerin added to the pastes lowered the strength of starch films, but sulphonated castor oil and soap made the starch films stronger. When the starch pastes were applied to cloth, differences in strength were due to the amount and distribution of starch adhering. The gelatin films had greater strength than any of the starches, and borax made them even stronger. Cornstarch films showed the least elongation, then followed dasheen, wheat rice, sweet potato, and canna starches in the order named. Potato starch films stretched the most. Total elongation produced in fabrics by these starches followed the same order. Starch films containing glycerin and sulphonated castor oil had greater elongation, but borax made the films less elastic. Gelatin films stretched more than starch films, but when applied to cloth, gelatin allowed less stretch than starch. Films of the gelatin mixtures had greater elongation than gelatin alone. In general, when cloth was sized with the starch and gelatin mixtures, soap and sulphonated castor oil permitted less stretch and glycerin more. Of the 7 starches, canna-starch films had the greatest folding endurance, then followed potato, sweet potato, corn, rice, wheat, and dasheen starches in descend-ing order. With increasing thickness of film, the folding endurance of each starch decreased. All of the sizing ingredients lowered the folding endurance of starch films. Gelatin films had considerably greater folding endurance than canna-starch films. In general, starches that produced the greatest stiffness in fabrics had the lowest folding endurance. Gelatin had much greater stiffening effect on fabrics than the starch. Borax gave increased stiffening power to both starch- and gelatin-sized fabrics. It also reduced the pliability of the films. Glycerin, sulphonated castor oil, and soap made the fabric less stiff, and in the gelatin sizes gave increased pliability.—M. S. Furry.

12022. GARLAND, E. A. Indian Ephedra. Indian Forester 64(10): 593-596. 1938.—Although different spp. of Ephedra are widely distributed all over the world, yet the spp. that are rich in active principles have so far been found to occur only in China, India and some parts of Spain. E. nebrodensis and E. gerardiana, found in north-western Himalayas and trans-frontier borders, are sufficiently rich in ephedrine for commercial purposes. The other species, E. intermedia, containing more of the pseudo-ephedrine, is also likely to find a market in the drug trade. Conditions in China and Spain which disturbed the market so long have offered a good opportunity to the Indian product.—J. N. Sen Gupta.

12023. GEORGI, C. D. V. The outlook for Malayan derris in the United States of America. Malayan Agric. Jour. 27 (1): 3-14. 1939.—A comparison is made of derris and cubé obtained from Lonchocarpus, as to trade of U. S., quality of products, value as insecticides, and prices. The problem of retaining the insecticidal values of the high grade Derris elliptica var. Changi No. 3 root in impregnated dusts and oil emulsions prepared in the field is discussed.—W. D. Pierce.

12024. GOEPP, R. MAX Jr., and K. R. BROWN. Resins from mannitol and sorbitol. *Indust. and Engineer. Chem.* 30(11): 1222-1227. 3 fig. 1938.—Ester gums and alkyds with commercial possibilities can be made from mannitol and sorbitol under controlled conditions (2.25-3 acid equivalents per molecule of hexahydric alcohol, purity of ingredients, heating schedules, agitation and atmosphere).—M. C. Moore.

12025. GROSSFELD, J., und H. TIMM. Eine neue Kennzahl für Olivenöl. Zeitschr. Untersuch. Lebensmittel 77(3): 249-253. 1939.—Olive oil contains an unsaturated hydrocarbon, "Squalen." The iodine number of fresh olive oil is therefore considerably higher than that of other vegetable oils while the I number of old and rancid olive oil is not greater than that of other oils. Drying of the hydrocarbon at 103° C for I hr. has no other effect on the I number than drying at room temp.—M. Kleiber.

12026. GUPTA, MAHADEO PRASAD, and SHIKHIB-HUSHAN DUTT. Chemical examination of Indigofera linifolia, Retz. The isolation of its active principle. Allahabad Univ. Stud. Chem. Sect. 1938: 27-32. 1938.—An unsaturated lactone, C₂₅H₂₆O₂ (Linifolin), m.p. 95-96°C, and a wax. C₄₂H₂₆O₂, m.p. 78-79°C, and which is a ceryl ester of palmitic acid, in addition to tannins, phylobaphins and glucose, were isolated from the alcoholic extract of the plant.

12027. HARTMANN, M., und E. SCHLITTLER. Über ein Alkaloid aus Vallesia glabra. Helvetica Chim. Acta 22 (3): 547-549. 1939.—Vallesin, C₂₂H₅₀N₂O₂, is contained in the leaves of V. glabra (Apocyanaceae) to about 0.3%. One of the N-atoms is contained in an indol structure, and the other is acetylated. The alkaloid is identical with the known aspidospermin from the related Aspidosperma quebracho-blanco, and the name "vallesin" should be dropped.—F. A. McDermott.

12028. KARRER, P., und B. H. RINGIER. Herstellung von d, 1-a-Tocopherol aus synthetischem Phytol. Helvetica Chim. Acta 22(3): 610-616. 1939.—Phytyl bromide was synthesized in 11 steps, starting with hexahydro-pseudoionone, and from this the tocopherol was produced. The allophanate of the latter showed a melting point of 168° C., 4° lower than the product from natural phytol, but had the

same Vitamin-E activity.—F. A. McDermott.
12029. KARRER, P., und H. KELLER. Potentiometrische Titration von Weizenkeimlingsölen. Helvetica Chim. Acta 22(3): 617-618. 1939.—The tocopherol content of wheat and corn germ oil varies greatly, many samples showing only 10 to 20% of that of summer oils. Separate gold titrations of the sterine-free unsaponifiable fractions of 2 samples of wheat-germ oil showed 8.8% and 16.16% of tocopherol, these figures both giving somewhat lower total amounts of vitamin than the direct titration of the unsaponified oil. The vitamin appears to be protected in the oil.—F. A. McDermott.

12030. KARRER, P., und OTTO HOFFMANN. Ein höheres Homologes des a-Tocopherols. Helvetica Chim. Acta 22(3): 654-657. 1939.—d, l-5, 7-Dimethyl-8-Tocol was prepared and found to show Vitamin-E activity in 16 mg. doses

on rats.—F. A. McDermott.
12031. KARRER, P., und H. FRITZSCHE. Über zwei 5-Amino-curmarane. Helvetica Chim. Acta 22(3): 657-660. 1939

12032. KARRER, P., H. FRITZSCHE, und R. ESCHER. Die niedrigeren Homologen des a-Tocopherols. Oxydationsprodukte tocopherolähnlicher Verbindungen. Helvetica Chim. Acta 22(3): 661-665. 1939.— γ -Tocopherol is possibly an impure β -tocopherol, since there is no depression of the melting point with mixtures of the two allophanates. β -Tocopherol is d-5, 8-dimethyltocol.—F. A. McDermott.

12033. KUENTZEL, A., und K. DOEHMER. Untersuchungen über die Verkleisterung der Stärke. Lichtelektrische und ultramikroskopische Analyse der Verkleisterung. Kolloid Zeitschr. 86(1): 124-130. 4 fig. 1939.—The conversion of starch into paste on heating takes place in 2 phases that start at 2 distinct temps., which can be detd. by automatic registration of the temp. of the starch emulsion and of the amt. of light absorbed by the emulsion. At the 1st point the starch crystals melt, at the 2d point the hydration (swelling, solution) of the starch molecules, separated from the lattice, begins.—M. Newhof.

begins.—M. Neuhof.

12034. KUENTZEL, A., und K. DOEHMER. Untersuchungen über die Verkleisterung der Stärke. Thermometrische und konduktometrische Messungen in Stärkesuspensionen während der Verkleisterung. Kolloid Zeitschr. 86(1): 130-134. 1939.—Measurements of the heat change and the change of conductivity confirm the assumption that the conversion of starch into paste consists but of 2 partial reactions. During the 1st phase a negative change of heat takes place (heat of fusion), during the 2d phase a positive change of heat occurs (heat of hydration). The beginning of the 1st phase can be exactly determined by measurements of the temp.; the start of the swelling (2d phase) is marked by the sudden increase of the conductivity.—M. Neuhof.

12035. LAL, JAGRAJ BEHARI. Constitution of Santalin. Allahabad Univ. Stud. Chem. Sect. 1938: 43-50. 1938.—A pigment from the heartwood of Pterocarpus santalinus.

12036. MANSKE, RICHARD H. F. The alkaloids of fumariaceous plants. XVIII. Fumaria officinalis L. Canadian Jour. Res. Sect. B, Chem. Sci. 16(12): 438-444. 1938.—An examination of F. officinalis has disclosed the presence of 7 alkaloids. Of these, only protopine (0.05%) had been previously reported. In this plant other known alkaloids are dl-tetrahydro-coptisine (2.5 p.p.m.), cryptocavine (20 p.p.m.), aurotensine (0.4 p.p.m.), and possibly sinactine (22 p.p.m.) which, however, was not conclusively identified and is referred to as alkaloid F36. The remaining 2 alkaloids are apparently new; F37 (26 p.p.m.), C₂₂H₂₂O₂N, is non-phenolic and contains 2 methoxyl groups; F38 (3 p.p.m.) C₂₂H₁₂O₄N, is phenolic and is probably a phthalide isoquinoline alkaloid. A neutral substance, C₁₁H₁₂O₃, was also isolated. Attention is directed to the significance of alkaloid structure in an evolutionary series of plants, and some preliminary generalizations are adumbrated.—Auth. abst.

12037. MANSKE, RICHARD H. F. The alkaloids of

12037. MANSKE, RICHARD H. F. The alkaloids of fumariaceous plants. XIX. Corydalis ophiocarpa Hook. f. et Thoms. XX. Corydalis micrantha (Engelm.) Gray and Corydalis crystallina Engelm. Canadian Jour. Res. Sect. B 17(2): 51-60. 1939.—XIX.—Nine alkaloids have been isolated from Corydalis ophiocarpa, only 1 of which, ophiocarpine, C₂₀H₂₁O₅N (F39), is definitely characterized as new. It is a hydroxy-canadine in which the hydroxy group probably occurs in position 13. A 2d alkaloid, which may be new, is referred to as alkaloid F40. Berberine, its tetrahydroderivative, namely l-canadine, and l-corypalmine constitute the remaining protoberberine alkaloids that were found. The presence of l-adlumine was established. This is the 3d plant from which it has been isolated. In addition, protopine, a-allocryptopine and cryptocavine, all of which contain the 10-membered ring characteristic of the first, were isolated.—XX. Chemical examination of C. micrantha and of C. crystallina has shown that their relation is not as close to C. aurea as taxonomic classification would suggest. C. micrantha contains protopine, l-tetrahydro-palmatine, capaurine, capauridine, scoulerine, and 3 unidentified phenolic alkaloids (F41, F42, and F43). C. crystallina yielded only a small amount of total bases from which protopine, bicuculline, and capnoidine were isolated.—Auth. abst.

12038. MANSKE, RICHARD H. F. The alkaloids of Senecio species. III. Senecio integerrimus, S. longilobus, S. spartioides and S. ridellii. IV. Erechtites hieracifolia (L.) Raf. Canadian Jour. Res. Sect. B, Chem. Sci. 17(1): 1-9. 1939.—III.—Senecionine is the main alkaloid of S. integerrimus, but a small amt. of a new alkaloid, integerrimine (C18H26O5N), was also found. S. longilobus contains longi-

lobine (C₁₈H₂₈O₅N) and S. ridellii contains ridelliine (C₁₈H₂₈O₅N), both alkaloids being new. In addition to the main alkaloid of S. spartioides, which was identified as seneciphylline, a minor base, spartioidine (C₁₈H₂₃O₅N), apparently new, was obtained. Hydrolysis of the new alkaloids that were available in sufficient quantity for this purpose yielded, in all cases, retronecine and a new necic acid. A structural formula for senecic acid is proposed. Chem. examination of Senecio spp. may be used as an aid to botanical classification.—IV. An examination of E. hieracifolia, during which 2 alkaloids were isolated, emphasizes the close chemical relation which the genus Erechtites bears to Senecio. The chief alkaloid, hieracifoline, C₁₈H₂₂O₅N, on hydrolysis yields retronecine and hieracinecic acid. The alkaloid is therefore of the type generally elaborated by Senecio spp.—Auth. abst.

12039. MANSKE, RICHARD H. F., and ARCHIE E. LEDINGHAM. A synthesis of α-naphthyl-acetic acid and some homologues. Canadian Jour. Res. Sect. B, Chem. Sci. 17(1): 14-20. 1939.—In the course of a study of the synthesis of α-naphthyl-acetic acid, a method was elaborated by Cambron that made available large quantities of α-chloromethyl-naphthalene. During the purification of the crude product and in the later stages of the synthesis by-products were encountered, including methyl α-naphthyl-methyl ether, di-α-naphthyl-methyl ether, α-naphthyl-methyl ether, α-naphthyl-acetic acid, m.p. 280°C, via the corresponding nitrile. δ-(1-naphthyl)-valeric acid, m.p. 84°C, and ε-(1-naphthyl)-hexoic acid, m.p. 62°C, were synthesized by standard procedures.—Auth. abst.

12040. MARION, LEO, and RICHARD H. F. MANSKE. Calycanthine. III. Some degradation experiments. Canadian Jour. Res. Sect. B, Chem. Sci. 16(12): 432-437. 1938.—The identification of 4-carboline amongst the degradation products obtained by the action of Se on calycanthine makes it possible to account for 12 of the 22 C atoms of calycanthine. The fusion of calycanthine with phthalic anhydride yielded 12,13-benzcanthin-11-one, which was also obtained from tryptamine and phthalic anhydride. On the basis of these observations a partial formula for calycanthine is suggested. The oxidation of calycanthine with mercuric acetate eliminated 2 H atoms, giving rise to a base which can be reduced again to calycanthine. Reduction of calycanthine with HI and red P yielded quinoline, and methylation in the presence of air gave rise to oxygenated products containing 3 N atoms, and to methylamine. The phenylcarbamyl derivative of calycanthine has the same ultimate composition as, but differs from, that of N-methyltryptamine.—Auth. abst.

12041. MARION, LÉO. The occurrence of l-nicotine in Asclepias syriaca L. Canadian Jour. Res. Sect. B, Chem. Sci. 17(1): 21-22. 1939.—In the root.

12042. MUENSCHER, WALTER CONRAD. Poisonous plants of the United States. xvii + 266p. 75 fig. Macmillan Co.: New York, 1939. Pr. \$3.50.—No general treatment of the poisonous plants of the U. S. has appeared since the publication of Pammel's "Manual of Poisonous Plants" (1911). In the meantime, knowledge of poisonous plants has been greatly extended. This textbook is, therefore, a timely one. After an introductory part, consisting of a brief and general consideration of the nature of poisonous plants and conditions under which they cause poisoning, it takes up, family by family, all the vascular plants of the U. S. that are known to cause poisoning, when eaten, by contact, or by mechanical injury, to man or animals. For each important species the author gives a concise description of the plant and an account of its distribution and habitat, poisonous principle (if known), conditions of poisoning, symptoms, and treatment. The commonest and most important of the spp. are illustrated. 11 pages of literature references are given.

12043. PREISS, W. Über den Methylalkoholgehalt von Tabaken und Tabakrippen. Zeitschr. Untersuch. Lebensmittel 77(3): 272-281. 1939.—Non-fermented tobacco may contain 0.9% of methyl alcohol; fermented tobacco contains only 0.04 to 0.2%. The author differentiates between that part of methyl alcohol which can be split from its ester combination with pectin and that which is derived from a

12044-12058

lignin combination. The former is obtained by distilling a mixture of tobacco, water and NaOH whereby the alcohol bond with lignin remains intact. The bonds with lignin can

be destroyed by H2SO4.-M. Kleiber.

be destroyed by H₂SO₄.—M. Aletoer.

12044. PRITZKER, J., und R. JUNGKUNZ. Über eine seltene Fälschung von Olivenöl. Zeilschr. Untersuch. Lebensmittel 77(3): 254-256. 1939.—An adulteration of olive oil with tea seed oil and an artificial coloring with chinolin yellow escaped detection by the ordinary methods of testing but could be established by observation in u.-v. light. The fluorescence of the suspected oil was green like that of peanut oil to which chinolin yellow had been added; the fluorescence of 2 samples of genuine olive oil was reddish

like salmon meat.—M. Kleiber.

12045. PUNTAMBEKAR, S. V. Commercial possibilities of a new detergent and some related lauryl compounds. Ind. Chem. Soc. Industrial & News Edition. (C) 1(1/2): 19-24. 1938.—The ideal detergent properties of Na lauryl sulphate and the important uses of some related lauryl compounds are described and a suggestion is made that lauric acid, the basic material for the manufacture of these valuable compounds, could be more profitably obtained from the fats of several indigenous Actinodaphne and Litsaea spp. (Lauraceae) than from cocoanut and palm kernel oils. Physical and chemical constants of the fats from the berries of Actinodaphne hookeri, A. augustifolia, L. chinensis, L. zeylanica, L. citrata and Cinnamomum camphora are given in a tabular form.—Auth. abst.

12046. RIPAN-TILICI, R., und F. CRISTEA. Die kon-

duktometrische Mikrobestimmung von Nicotin in Tabak destillaten. Zeitschr. Untersuch. Lebensmittel 77(3): 283-289. 1939.—Determination of nicotine in tobacco by distillation and titration with N/20 silico-tungstic acid with

measurement of the electric conductivity.—M. Kleiber.
12047. RUZICKA, L., K. HUBER, PL. A. PLATTNER,
S. S. DESHAPANDE, und S. STUDER. Zur Kenntnis der
Sesquiterpene (43). Zur Konstitution des Caryophyllengemisches. Abbau des Dihydro-caryophyllens. Helvetica Chim. Acta 22(3): 716-727. 1939.

12048. RUZICKA, L., und G. ROSENKRANZ. Zur Kenntnis der Triterpene (48). Über Oxydationsproduckte des Lupeols und von Estern der Lupeols mit Phthalmonopersäure und mit Selendioxyd. Helvetica Chim. Acta 22(3):

778-788. 1939.

12049. RUZICKA, L., A. GROB, und F. CH. van der SLUYS-MEER. Zur Kenntnis der Triterpene (49). Oxydation des Acetyl-oleanolsäure-methylesters und des Acetylsumaresinonsäure-methylesters mit Selendioxyd. Helvetica Chim. Acta 22(3): 788-792. 1939.

12050. St. PFAU, ALEXANDRE, et PL. A. PLATTNER Études sur les matières végétales volatils. X. Sur les vetivones. constituants odorants des essences di vetiver. Helvetica Chim. Acta 22(3): 640-654. 1939.—The odor of vetiver is due principally to a group of α -ethylene, bicyclic sesquiterpene ketones, $C_{15}H_{22}O$. One of these, β -vetivone, has

sesquiterpene ketones, C₁₅H₂₂O. One of these, β-vetivone, has been particularly studied, with the view of eventually determining its structure.—F. A. McDermott.

12051. VALENTIN, H. Über eine einfache Coffeinreaktion in Kaffee und Teeaufgüssen. Zeitschr. Untersuch. Lebensmittel 77(3): 248. 1939.—A red brownish precipitate occurring upon the addition of diluted H.SO₄ and N/10 indicates the property of the second of the contract of the co

iodine soln. indicates the presence of caffein.—M. Kleiber.
12052. WAGNER, H. Über die Zusammensetzung des nach dem Kaffee-Hag-Verfahren aus den Kaffeebohnen Lebensmittel 77(3): 225-247. 1939.—The Kaffee-Hag process for obtaining caffein-free coffee yields a wax which by extraction with petroleum ether can be separated into a thick oil and a brown sticky powder. The fraction soluble in petroleum ether contains considerable amts. of palmitic. oleic, and linoleic acid, caffein, a phytosterol and a substance which is easily oxidized and changed by light (Kahweol). Capric acid, stearic acid and daturic acid could not, contrary to earlier reports, be detected in the extract.—M. Kleiber.

12053. WOKER, G., und I. AUTENNER. Weitere Farhreaktionen von Sterinen in ihrer Beziehung zu konstitutiven Faktoren. Helvetica Chim. Acta 22(3): 666-672. 1939.—A further study of the furfural sulfuric acid color reactions, as applied to structural differences. Digitoxigenin, gitoxigenin, and various polyphenols were tested.—F. A. McDermott.

12054. WOODRUFF, SYBIL. Microscopy of starch by the Spierer lens. Indust. and Engineer. Chem. 30(12): 1409-1413. 19 fig. 1938.—A first report with photomicrographs of the use of a Spierer lens to study the microscopic

structure of starch.—M. C. Moore.
12055. ANONYMOUS. Ephedra. Indian Forester 64(10): 632-636, 1938.—The introduction of the drug Ephedra into Western medicine for the treatment of asthma and hay fever is recent. 5 spp. of the genus are stated to occur in India, chiefly at high altitudes in the mountains of Baluchistan and the Himalayas. Of these, 2 closely allied species, E. nebrodensis and E. gerardiana, are said to have given promising results. The influence of rainfall plays an important part in ephedrine content,— a high content being associated with a low rainfall. Suggestions have been made to raise the species in different parts of the empire. -J. N. Sen Gupta.

PLANT PHYSIOLOGY. BIOCHEMISTRY. AND BIOPHYSICS

F. E. DENNY, Editor

(See also in this issue Entries 10703, 10753, 10754, 10758, 10789, 10934, 11018, 11239, 11761, 11762, 11764, 11766, 11798, 11846, 11922, 11925, 11929, 11944, 11981, 11987, 11991, 11997, 12027, 12028, 12029, 12036, 12039, 12054,

ABSORPTION, NUTRITION

12056. COLWELL, WILLIAM E., and G. ORIEN BAKER. Studies of boron deficiency in Idaho soils. Jour. Amer. Soc. Agron. 31(6): 503-512. 5 fig. 1939.—When 5 sunflower plants are grown in a small quantity of soil which is watered with -nutrient soln. containing all the essential elements except B, they develop characteristic B-deficiency symptoms if the quantity of B already present is not great enough to meet their requirements. This method of detecting B-deficient soils is a valuable aid to field tests which are much more time consuming and costly. A good correlation was found between field and greenhouse results. Several soil series in Northern Idaho have been shown to be deficient in B, especially for alfalfa. When a nutrient soln relatively high in nitrate N was used, the B deficiency symptoms on the sunflowers become apparent several days sooner. Further work is being done to investigate the effect of varying quantities of B upon N uptake and to see whether or not the function of B is in some way related to the regulation of the nitrate ion absorption or N metabolism.—Authors.

12057. JENNY, H., and R. OVERSTREET. Contact

effects between plant roots and soil colloids. Proc. Nation. Acad. Sci. U. S. A. 24(9): 384-392. 5 fig. 1938.—The prevailing theories of mineral absorption by plants from soils are based on the concept of the soil solution, which is identified, essentially, with the nutrient soln. of the plant physiologist. The roots excrete carbonic acid into the liquid phase surrounding the soil particles. H-ions replace K⁺ from the surface of soil colloids, and the resulting KHCO₂ is ready for intake by the roots. A theory for an additional method of mineral intake by plants from soils is here proposed, based on the phenomenon of ion interchange existing between 2 surfaces in contact. In view of the exptl. results obtained, it is believed that concepts of the mechanism of mineral absorption must be modified and extended. Ions of the same species may move both into and out of the root at the same time, the outgo being especially pronounced when the roots are in contact with colloidal systems. Accumulation and depletion are only net effects of ionic movements.—Courtesy Exp. Sta. Rec.

12058. PIRSON, ANDRÉ. Über die Wirkung von Alkaliionen auf Wachstum und Stoffwechsel von Chlorella. Planta 29(2): 231-261. 8 fig. 1939.—If Chlorella, starved for K, is given K, photosynthesis is revived in 2 phases: 1) the K-ion acts directly upon the starved mechanism; 2) enhancement takes place which is connected with neoformation of chlorophyll and other cell materials. In 1) reaction Rb can take the place of K, Cs is only a partial substitute; in 2) even Rb is not a perfect substitute. Cs does not maintain mitosis and chlorophyll increase. Respiration is independent of photosynthesis and K, Rb and Cs impede the increased respiration of cells starved for K. In the presence of K, Cs and in a higher degree Rb are beneficial to Chlorella.—B. R. Nebel.

12059. STREBEYKO, P. v. Über den Einfluss von Phosphor auf die Stickstoff und Schwefelaufnahme bei Hafer. Planta 29(1): 228-230. 1938.—During the period of early growth a shortage of P in the tissues seriously curtails the uptake of N and S, thus influencing the entire metabolism

of the plant.—B. R. Nebel.

12060. TRELEASE, SAM F., and MILLICENT E. SELSAM. Influence of calcium and magnesium on the growth of Chlorella. Amer. Jour. Bot. 26(5): 339-341. 1939.

—The growth of C. vulgaris was not increased by the addition of CaCl₂ to the culture soln. In the absence of Ca this alga tolerated high cones. of Mg salts, making considerable growth in a cone. as high as 0.42 M MgSO₄. When enough Mg was added to the culture soln. to depress the growth of Chlorella, addition of Ca did not diminish the toxicity of the Mg.—S. F. Trelease.

When enough My was added to the culture soin. To depress the growth of Chlorella, addition of Ca did not diminish the toxicity of the Mg.—S. F. Trelease.

12061. WAKSMAN, S. A., and J. W. FOSTER. [The effect of zinc on the growth of Rhizopus nigricans and the production of acid by this organism.] Compt. Rend. Acad. Sci. [Paris] 207(12): 483-486. 1938.—Among the heavy metals, the effect of Zn on the growth and nutrition of Rhizopus is said to be distinctly catalytic, glucose being utilized more completely in its presence. The proportion transformed into acid was diminished, while a greater part was utilized for energy than for cellular synthesis.—Courtesu

Exp. Sta. Rec.

12062. WALLACH, ANNEMARIE. Beiträge zur Kenntnis der Wasseraufnahme durch die Luftwurzeln tropischer orchideen. Zeitschr. Bot. 33(10): 433-468. 1938.—Expts. with excised roots and with whole plants of Vandu tricolor showed no absorption of water vapor. The capacity for water of the velamen is about 116%; the amt. of water taken up by previously dried and non-dried plants is the same but the rate is 8 times as quick in dry plants. The uptake of water through the year has a maximum in months Dec.-Feb. In the greenhouse there is a definite increase in water entrance during the day. Expts. in dark chamber showed that lighted plants take up twice as much water as plants in the dark; transpiration also increased under light conditions. Transpiration (detd. gasometrically) showed no definite correlation with outer factors during day nor any connection with water uptake. After 8 days' wilting there is a very small loss of weight from the leaf (1-4%); immersed in water the leaf then rapidly takes up water until original weight is equalled or exceeded (in 24 hrs.). If the leaf is not wilted it takes up no water. An attempt was made to follow the radial movement of water by the use of dyes. These rapidly pass the cortex; the velamen, root apex and older regions stain readily (in acid or basic dyes) whilst the extending zone remains unstained. Colorimetric detas, showed a quick entrance of nitrate and phosphate solas. Nitrate is completely absorbed, phosphate only partially. Conductivity methods could not be used to determine the rate of salt entrance as the roots exercte considerable amts. of acids.—J. H. Priestley.

AUXINS, GROWTH HORMONES

12063. BORGSTRÖM, GEORG. Influence of growth-promoting chemicals on roots of Allium. I. Bot. Notiser 1939(1): 207-220. 8 fig. 1939.—Longitudinal growth of Allium roots was observed as influenced by naphthalene acetic acid, indolyl acetic acid, indolyl butyric acid, phenyl acetic acid and phenyl propionic acid. The quantitative relationship was determined between effective amts. of hormones and corresponding reaction of the organs. The killing limits as well as growth-retarding and growth-promoting cones. of the above chemicals were detd. Growth

was retarded in all relatively high cones of the various substances. Both vitamins B_1 and C were always growth-promoting within wide cone ranges.— $T.\ R.\ Swanback$.

12064. CHOUARD, PIERRE. Sur le rôle des auxines dans l'organogenèse des plantes vasculaires. Bull. Soc. Bot. France 85(7/8): 546-555. 1 pl. 1938.—Soaking in titrated solns. of pure heteroauxin, and controlling the point of application (a) by proper incisions and complementary soaking in pure water, and (b) by orientation in relation to gravity to modify the currents of transpiration and diffusion, the author has localized at the desired points the effects of various and definite doses of heteroauxin in leaves of Alloplectus lynchii, Begonia rex, Endymion nonscriptus, and Brimeura amethystina. Under these conditions buds and roots are produced at any point of these leaves and in any order of succession. He concludes that auxins and heteroauxins are not "rhizocalines," that they are not agents of organogenesis, but in addition to their well-known rôle of causing cell elongation they are only very active agents of unorganized cellular proliferation, the initial stage of all organ formation. Properly speaking, organization is the result of other factors.—P. D. Strausbaugh.

12065. FRIES, NILS. Über die Bedeutung von Wuchstoffen für das Wachstum verschiedener Pilze. Symbolae Botanicae Upsalienses 3(2): 1-188. 1938.—Four strains of wood-destroying bacteria produced growth promoting substances for 11 polypores. These substances were thermostable, insoluble in Et₂O but soluble in 88% EtOH. Of the foregoing 11 fungi, Polyporus adustus, P. abietinus, P. annosus, P. benzoinus and Trametes serialis require thiamin; Lenzites sepiaria and Daedalea unicolor have a relative need for thiamin, although the last organism may have an absolute need under some conditions. Thiamin was without effect on Aspergillus niger, Fusarium conglutinans var. callistephi, and Hypochnus solani; Penicillium notatum, Nectra coccinea, Valsa ceratophora, Sclerotinia cinerea and Xylaria hypoxylon (?) grew without thiamin. They flourished much better upon the addition of the vitamin. Phycomyces blakesleeanus, Phytophthora cactorum and Helvella infula must have thiamin for growth. Lophodermium pinastri, Valsa pini, Hypoxylon prunatum and Melanconium betulinum require an external source of both thiamin and biotin. Inositol seemed to replace biotin for Melanconium betulinum. Ashbya gossypü requires biotin and inositol but addition of thiamin increases growth. Thiamin and biotin exert a discernible effect on growth at concs. of 1:250,000,000,000,—V. G. Lilly.

12066. GUTHRIE, JOHN D. Inhibition of the growth of

12066. GUTHRIE, JOHN D. Inhibition of the growth of buds of potato tubers with the vapor of the methyl ester of naphthaleneacetic acid. Contr. Boyce Thompson Inst. 10(3): 325-328. 1 fig. 1939.—The methyl ester of naphthaleneacetic acid inhibits the growth of buds of potato tubers, and is sufficiently volatile at room temp. (25° to 28° C) that it can be introduced into intact tubers in the vapor form. The sprouting of whole tubers can be retarded by merely storing them in the presence of paper impregnated with the ester. The ester also induces epinasty of tomato leaves when a piece of filter paper containing a small amt. of the substance is placed in a bell jar with the plant.—

Auth. summ.

12067. JAKES, EMIL. Künstliche Hervorrufung von knollenartigen Gebilden bei Pflanzen im Keimblattstadium unter dem Einfluss von Heteroauxin. Planta 29(1): 110-113. 1938.—If seeds of Raphanus sativus radicula are soaked in indol-3-acetic acid 0.001 to 0.0001 g per cc., nodulation is induced which increases with the increase in conc. This increases with lower temp. (16-18° C) in diffuse light as compared with higher temp. (30° C) and darkness. The nodulations are due to primary thickening localized between the radicle and the hypocotyl.—B. R. Nebel.

12068. JOST, LUDWIG. Zur Physiologie der Wuchsstoffe. IV. Zeitschr. Bot. 33(5): 193-215. 1938.—Split pieces of stems which show concave curvature may alter to convex when growth substance is applied, a change which van Overbeek and Went have attributed to a chemotropic response to the growth substance. As the wound should be impermeable to the growth substance, it should enter only through the outer side and accelerate growth on this outer

surface. The fact that the hollow stems of Taraxacum react just as the pea stem, as also the coleoptiles of Avena and Zea, shows that the assumption of van Overbeek and Went is not correct. The present expts. show that the phenomenon is governed throughout by nastic, not by tropic, responses. It is quite indifferent whether the growth substance is added from outside or inside; the same response is obtained. Wound surfaces probably oxidize the growth substance but they do not destroy it completely. Helianthus stems which have been split and decapitated and have had their epidermis removed still show a good "Went reaction" if paste is used. Solns. of growth substances give much less clear results, possibly because all tissues then take up so much water that the "Went reaction" is masked. The action of the growth substance consists in an acceleration of the extension growth of the cortex in the course of some 5-8 hrs. which the pith resists so that the original tensions are reversed. There is also a deeper physiological difference; growth substance in high concs. has already exceeded its optimal conc. for the pith but has not yet reached its optimum conc. for the cortex. The "Went reaction" has been noticed only in a few objects; the majority of growing shoots do not show it, though in a few cases it might be exceptionally demonstrated by the use of growth-substance pastes.—J. H. Priestley.

12069. KINOSHITA, SABURO. Über die Potentialver-

teilung und den Wuchsstofftransport bei den Keimpflanzen von Helianthus annuus und Pisum sativum. Bot. Mag. [Tokyo] 53(626): 83-89. 9 fig. 1939.—The growing apical portion of the *Helianthus* hypocotyl is electropositive with respect to the non-growing basal region. The point of attachment of the cotyledons has an even higher potential than the apex. Removal of the cotyledons results in a reduction of the potential of the apex, so that the apex becomes electronegative with respect to the base. Application of heteroauxin paste to the plants from which the cotyledons have been removed raises the potential of the apex, resulting in a potential distribution similar to that of the intact plant. In the epicotyl of *Pisum* the base is normally electropositive toward the apex; removal of the cotyledons reverses this condition and application of heteroauxin paste restores it. It is concluded that the maximum in the potential distribution curve occurs not only in the growth zone but also at the site of reserve-material deposition or of growth-substance production. In both intact and decapitated Helianthus hypocotyls an externally applied electric current may augment or diminish the natural potential difference depending upon whether the anode is applied to the base or the apex, respectively. If, to a geotropically stimulated hypocotyl, an electric current is applied from base to apex, the geotropic reaction is increased; a current applied in the opposite direction reduces the reaction. This effect is apparently due to an influence of the electric current on the growth-substance distribution

in the hypocotyl.—R. L. Weintraub.

12070. McROSTIE, G. P., J. W. HOPKINS, and N. H. GRACE. Effect of phytohormone dusts on growth and yield of winter wheat varieties. Canadian Jour. Res. Sect. C, Bot. Sci. 16(12): 510-515. 1938.—Various concs. of indolyland naphthylacetic acids were applied to 10 vars. of winter wheat prior to planting in a replicated field trial, one-half of each plot receiving seed dusted with Ceresan + phytohormone, the other half receiving an equal quantity of seed of the same var. dusted with Ceresan only. Some differences between the hormone-treated and untreated sub-plots in respect to early growth and subsequent density of stand were apparent to visual inspection. There were also statistically significant differences in respect to straw production, and to yield, weight per bushel, and N content of grain. The effects on grain yield were complicated by the differential response of vars. to the same treatment, and at the higher concs. some depressions of yield resulted. On the average both chemicals tended slightly to reduce the N content of the grain produced.—Auth abst.

12071. MYERS, M. C., R. A. BOWDEN, and F. E. HARDISTY. Stimulation of kudzu cuttings. Science 88 (2277): 167. 1938.—Rooted cuttings of kudzu treated with several commercial hormone products showed an increase in number and size of roots over the untreated cuttings. KMnO₄ appeared superior to any hormone product tested

for kudzu in percentage of strike and size and number of roots developed.—Courtesy Exp. Sta. Rec.

12072. RIPPEL, CARL. Über den Gehalt von Zellteil-

12072. RIPPEL, CARL. Uber den Gehalt von Zellteilungshormones in Samen und Keimlingen von Pirus malus, Prunus domestica und Prunus avium. Planta 29(1): 1-10, 1938.—The test is made with Saccharomyces cerevisiae as described in earlier papers. One unit is the amount that allows 1 yeast cell to give rise to 1000 cells in Boas' nutrient soln. Seeds contain large quantities of the hormone complex. From the tables this appeared highest in the peeled seeds of apples and lowest in the seed coat and endosperm of P. domestica.—B. R. Nebel.

of apples and lowest in the seed coat and endosperm of P. domestica.—B. R. Nebel.12073. SMITH, C. L., and L. D. ROMBERG. A method for the treatment of cuttings and roots of the pecan with root-inducing chemicals. Plant Physiol. 14(1): 177-178. 1939.—Round toothpicks (used as carriers of the chemical) are soaked in an alcoholic solution of the chemical; the alcohol is allowed to evaporate; and the impregnated toothpicks are inserted in small holes bored in the cuttings or roots.—C. L. Smith.

GERMINATION, DORMANCY

12074. FUNKE, HILDEGARD. Beiträge zur Kenntnis von Keimung und Bau der Mistel. Beih. Bot. Centralbl. Abt. A. 59(1/2): 235-274. 2 pl., 5 fig. 1939.—Light is necessary for the germination of mistletoe (Viscum album) seeds and speediest germination demands artificial light at night. Light acts as such and not as heat. Time required for germination of seeds is shortened by treatment with hot water, ether, washing in a sieve, nightly illumination and removal of endosperm. The last is most effective. Seeds are injured by a period of darkness of two days. For good germination one must use fresh seeds, avoiding storage in Failure to germinate in mid-winter is more a darkness. matter of low light intensity than of low temp. An inhibiting substance is present in the mucilage, seed and leaves of mistletoe. Secretion from the hypocotyl end of seed is not acid and has no cellulose-dissolving action. It serves only to attach the seed to the host plant. The cell walls of mistletoe consist of callose, cellulose and pectin. Penetration of the haustoria seems to be mainly mechanical by crushing the cell walls of the host. A substance is often found between the cells of the host and parasite. This seems to be formed from a secretion from the parasite and from

the crushed cells of the host.—W. Crocker.

12075. THORNTON, NORWOOD C. Oxygen regulates the dormancy of the potato. Contr. Boyce Thompson Inst. 10(3): 339-361. 4 fig. 1939.—Freshly-harvested potatoes do not sprout because the bud tissue obtains too much oxygen rather than an insufficient supply of oxygen. Freshly harvested potatoes will sprout in 7 days if held in 5 to 10% of O₂ under a moist condition, in 9 days if held in 2% of O₂ under a dry condition; sprouting of the potatoes will not take place until 47 days after harvest if the tubers are held in 20% of O₂. The skin (periderm) of the potato tuber is more permeable to O₂ at harvest than at any other time. Upon ageing in storage, the tuber develops in the periderm many layers of cells, the cell walls become increasingly thicker, and a greater preponderance of suberin is found in the cell walls. Because of the gradual thickening of the periderm the potato tuber will sprout in progressively higher percentages of O2 until sprouting is obtained in as much as 100% of O₂ many weeks after harvest. Moist conditions facilitate, dry conditions retard, the formation of the periderm. This is the reason that potatoes stored under moist conditions will sprout earlier than potatoes stored under a dry condition. In some vars. of potatoes the periderm thickens more rapidly than in others, thus accounting for the difference in length of natural dormancy with different vars. The rest period of dormant potatoes can be shortened by removing the skin, because the new periderm or "wound cork" tissue that develops rapidly is more effective than the normal periderm in retarding the passage of O2 into the tuber. Cut potatoes placed in high percentages of O₂ are temporarily retarded from producing sprouts until the "wound cork" tissue develops to a greater thickness. O₂ concs. of 2 to 10%, which break the dormancy, also cause complete elimination of apical dominance in the buds of an eye as well as in all eyes of the tuber so that each eye produces 3-4 sprouts instead of one sprout, as

is usually the case with non-dormant tubers. The periderm of the tissue adjacent to an eye influences the dormancy of the buds in that eye. Thus the removal of the periderm with subsequent suberization of the tissue hastens the growth of the buds in this eye (because of reduced penetration of O₂) irrespective of its position in relation to the apical eye of the tuber. The sprouting of one-eye pieces of both dormant and non-dormant potatoes can be prevented by frequently removing the skin or "wound cork" tissue, thus permitting the entrance of excess O₂ into the tuber. Sprouting will take place quite rapidly when this tissue is allowed to suberize. The sprouting of non-dormant potatoes can be hastened by storage in 10% of O₂ and temporarily retarded by storage in 50% of O₂. However, sprouting in 50% of O₂ will occur when the periderm increases in thickness so that it retards the passage of O₂.—
N. C. Thornton.

GROWTH, DEVELOPMENT

12076. FIEDLER, HERBERT. Die pflanzliche Gewebeund Organkultur. Zeitschr. Bot. 33(9): 369-416. 1938.—A

literature review with a bibliography of 6 pp. 12077 HARVEY, H. W. Substances controlling the growth of a diatom. Jour. Marine Biol. Assoc. United Kingdom 23(2): 499-520. 1939.—Ditylum brightwelli requires, for vigorous growth in artificial sea water, 2 organic substances, or groups of substances, in addition to inorganic salts. The substances, or groups, act in a manner complementary to each other. The effect of adding either is greatly increased by the presence of the other. One accessory substance, or group, has been obtained in impure state from natural sea water and from extracts of algae by adsorption natural sea water and from extracts of algae by adsorption on carbon and elution. It has properties of an inorganic acid or internal anhydride. Several organic compounds containing S possess similar activity, including compounds containing the $-S-CH_2-CH(NH_2)COOH$ group. The other substance or group has been obtained in impure state from extracts of algae and of yeast. A number of organic compounds possess similar activity. The diatom requires Mn, a conc. of one part per thousand million being sufficient for vigorous growth. The diatom made good growth when transferred to natural sea water, enriched with nitrate, phosphate and iron, collected from offshore at intervals between Oct. 1937 and June 1938. The diatom ceased growth and formed auxospores when transferred to natural sea water, enriched in the same manner, collected from offshore during the summer of 1937 and during the period between July 1938 and Jan. 1939. These natural sea waters could be rendered fertile in some cases by adding a comround containing the $-S-CH_2CH(NH_2)COOH$ group and in some cases by adding 1-2 mg. Mn per cu. meter. Water collected during the winter of 1938 became infertile after 9 months' storage, due to loss of available Mn.—H. W.

12078. LINDEBERG, GÖSTA. Über den Einfluss von Aneurin und Biotin auf das Wachstum einiger Mykorrhizenpilze. Bot. Notiser 1939(1): 241-245. 1939.—Aneurin stimulated the growth of Rhizopogon roseolus, Tricholoma imbricatum and T. pessundatum. Biotin alone did not stimulate growth; in combination it promoted growth of R. roseolus.—T. R. Swanback.

12079. ULRICH, ROGER. Influence des blessures sur la croissance des fruits. Bull. Soc. Bot. France 85(7/8): 586-596. 3 fig. 1938.—The observations were made of fruits developing in natural conditions. Spp. of Cheiranthus, Matthiola, Lunaria, Eschscholtzia, and Glaucium were studied. In all the spp. except L. biennis and E. californica, elongation is normally greatest in the middle third of the fruit; in Eschscholtzia it is greatest near the peduncle. In general wounding causes a temporary or permanent inhibition of growth, more or less intense according to the nature of the lesion. This inhibition is particularly marked when the wounding damages or suppresses the region of greatest growth and when young seeds are destroyed in the expt. In certain instances the injury accelerates elongation of one region of the fruit when elsewhere an inhibition is observed. Following severe wounding, the very young fruits generally die; the oldest ones do not respond.—P. D. Strausbaugh.

PHOTOPERIODISM

12080. FABIAN, INGE. Beiträge zum Lang- und Kurz-tagsproblem. Zeitschr. Bot. 33(8): 305-357. 1938.—The leaves and the defoliated stems of Ullucus tuberosus responded to a short-day stimulus. This stimulus was conducted downwards effectively, but only with difficulty upwards; the upward effect could only be noted when the plant above the stimulated region was kept in complete darkness. The stimulus could not be conducted through a graft union to influence another individual. The typical short-day response of Ullucus of runner production was not induced by heteroauxin. The long-day plants Agrostemma, Iberis and Hordeum reacted to small intensities of additional illumination at night with strong acceleration, the short-day plant Setaria with a retardation of the reproductive phase. A weakening of the light intensity delayed flowering, both in long-day and in short-day plants. At high additional light intensities Agrostemma formed few leaves, and their development soon stopped in favor of the reproductive phase. The number and length of the leaves increased with diminishing intensity. Setaria showed the greatest vegetative development under strong night lighting which protracted the reproductive development. In long-day plants morning light accelerated flower formation more than evening light; short-day plants were more strongly. retarded by morning light; an effect not related to the intensity of the light. If long-day plants, grown in a long day until flower primordia are present, were then transferred to a short day this hindered the time of flowering. Under the reverse conditions, after growth in short day transfer to long day, the flowering time was put forward. The reverse held for short-day plants; after short-day treatment until flower primordia are produced transfer to long day hindered flowering but transfer to short day after growth

under long day accelerated flowering.—J. H. Priestley.

12081. JONES, H. A., and H. A. BORTHWICK. Influence of photoperiod and other factors on the formation of flower primordia in the potato. Amer. Potato Jour. 15(12):
331-336. 1 fig. 1938.—The first inflorescence of the Sebago var. of potato was differentiated at about the same node (21.3-22.8) counting from the mother tuber regardless of size of seed piece (5-45 g.), growing temp. (80° F day, 55° night and 70° day and 45° night) or photoperiod (9-16 hrs.) used. However, small size of seed piece (5 g.), high growing temp. and short photoperiod (9 hrs.) each increased significantly the node number to the first inflorescence. The Chippewa and Earlaine vars. produced flower primordia when grown in total darkness.—H. A. Jones.

PHOTOSYNTHESIS

12082. BEILER, ALFONS. Untersuchungen tiber die Kohlensäureassimilation der Strand- und Dünenpflanzen. Jahrb. Wiss. Bot. 87(2/3): 356-407. 1938.—The detns. were made in the natural habitat. Definite differences were shown in the fresh-wt. assimilation which was least in halophytes, then in order followed psammophytes and mesophytes. The surface assimilation showed quite another comparison in view of the anatomical differences: on this basis halophytes, psammophytes and mesophytes all gave comparable values. It was not possible to isolate specific external factors as responsible for the fluctuations found in the daily curve of assimilation.—J. H. Priestley.

12083. HARTEL, OTTO. Die Bedeutung der Bodenkohlensäure für die grüne Pflanze. Jahrb. Wiss. Bot. 87
(2/3): 173-210. 1938.—The expts. were designed to follow
the movement of CO₂ from root to leaf and to test its
utility in carbon assimilation. A fall in the respiration of
roots with increased transpiration suggests that the CO₂
moves upwards with the transpiration stream. In the sap
exuding from decapitated shoots large amts. of CO₂ were
found (177-570 mg. per l.). The delivery of CO₂ to the
leaves from the roots was demonstrated by comparison of
CO₂ release from leaves, with root system and leaves supplied with CO₂ free air, in plants in solution free from CO₂
as against others in solutions with 0.5% NaH CO₃ added;
in the dark this CO₂ might be given off and appear as additional "respiration" from the leaf surface. In the light this
CO₂ was assimilated, on the evidence both of starch tests
and dry weight determinations.—J. H. Priestley.

12084. MARTHALER, HANS. Untersuchungen über den Kohlehydratgehalt von Alpenpflanzen. Jahrb. Wiss. Bot. 87(2/3): 267-300. 1938.—Samples were collected every 2 hours for analysis; in the same habitat the sugar content of different plant spp. varied during the day in a similar manner. With great regularity the sugar curves showed a fall between 12 and 2, a 1st maximum in the forenoon, a 2d in the afternoon. The fall is apparently due to 2 factors: (a) an accelerated removal of assimilates, (b) a slackening of assimilation around midday. The bulk of the sugar is present as reducing sugar. In only a few spp. as Pinus montana, Rhododendron ferrugineum and Gentiana lutea is there an ecologically significant accumulation of carbohydrates during the vegetation period.—J. H. Priestley.

hydrates during the vegetation period.—J. H. Priestley.

12085. MÜLLER, D. Über Kohlensäureassimilation in normal und invers beleuchteten Blättern. Planta 29(1): 216-227. 1938.—Under optimal lighting potato and mustard show less photosynthesis if the underside of leaves only is lighted. Under suboptimal conditions this is also true for Anthurium, Brunfelsia and Fittonia, of which only the last one has thin leaves. Under suboptimal conditions also mustard, potato, cucumber and Coleus show about the same amt. of photosynthesis for either position of the leaf.—B. R.

12086. SEYBOLD, A., und K. EGLE. Zur Kenntnis des Protochlorophylls. II. Planta 29(1): 119-128. 1938.—2 carotinoids, 2 protochlorophylls—protochlorophylls a and b—and one degradation product were isolated from fresh skins of mature pumpkin seeds. The spectral differences between the 2 protochlorophylls are greater than was previously assumed. Tables, graphs, and spectral diagrams illustrate the optical characteristics. Protochlorophyll b is present in much smaller amts. than a, b is more acid resistant than a. According to Scharfnagel it is possible that the protochlorophylls become chlorophylls in the presence of light.—B. R. Nebel.

12087. SIMONIS, W. Der Einfluss verschiedenfarbigen Anzuchtlichtes auf die CO₂-Assimilation und den Farbstoffgehalt von Helodea canadensis. Planta 29(1): 129-164. 1938. —The intensities of illumination which, according to the bubble method, would give equal photosynthesis in red, blue, and white light, were determined. Material which had been raised in red light required 47.3% of red light as against 74.5% of white and 100% of blue light for the same amount of work, while material raised in blue light required 83.9% of white and 57.8% of red light for the corresponding purpose. The differences of the material raised under different wavelengths are within limits not altered by the number of quanta delivered. Chromatic adaptation was traced to a relative increase of carotinoids in the blue light and a relative increase of chlorophyll in the material raised in red light —R R Nebel

raised in red light.—B. R. Nebel.

12088. STÄLFELT, M. G. Der Gasaustausch der Flechten. Planta 29(1): 11-31. 1938.—The dependence of gas exchange upon light and temp. was determined for one or several species of the following forms: Cetraria, Peltigera, Evernia, Parmelia, Cladonia, Ramalina, Usnea and Umbilicaria. The lichens require much light for photosynthesis. 3 factors aid the lichens to survive adverse conditions: the optimum range of the apparent photosynthesis in Cetraria is not sensitive to changes between 0° and 15°. The ratio of apparent photosynthesis to dark respiration increases with decreasing temps. Thus, during winter the plants photosynthesise without waste, during summer the waste is appreciable. However, this assures a relatively uniform rate of production.—B. R. Nebel.

TRANSPIRATION, TRANSLOCATION

12089. LEONARD, O. A. Translocation of carbohydrates in the sugar beet. Plant Physiol. 14(1): 55-74. 1939.—Sugar beet (Beta vulgaris) leaves were studied with reference to synthesis, translocation and transformation of the carbohydrates. Glucose, fructose, sucrose and dextrin underwent diurnal variations in the blades. Similar variations in the sugars but not dextrin occurred in the upper, middle and lower division of the petioles. Attempts to reverse translocation by bagging some of the mature leaves and allowing the others to be exposed to the sun were unsuccessful. By placing beet plants in the dark, a reversal of translocation occurred in immature leaves. Fructose increased more than

the other sugars with advance of the season. Leaves were placed with their bases in 3% glucose, fructose, and sucrose solns. All 3 of these sugars were readily interconverted within the leaves.—O. A. Leonard.

12090. THUT, HIRAM F. The relative humidity gradient of stomatal transpiration. Amer. Jour. Bot. 26(5): 315-319. 1939.—The relative humidity gradient of stomatal transpiration was demonstrated by measuring the relative humidity or equivalent of the leaves, the humidity of the stomatal openings and intercellular spaces, and the humidity of the external air. The relative humidities of the tissues were measured by the suction-tension or diffusion-pressure deficit method. Measurements were made of the humidity of the stomatal openings and intercellular spaces by noting the effect various relative humidities had on transpiration. This was done by exposing small portions of mature leaves over humidity bottles that contained H2SO4 solns. or NaOH pellets, the rest of the plant being exposed to the usual laboratory conditions. The water loss from such leaves was an inverse linear function of the relative humidity. However, in the region of high relative humidity, water was absorbed from the bottles and not lost. The zero point of water loss from the leaves to the humidity bottles was interpreted as the relative humidity of the stomatal openings and intercellular spaces. The humidity of the air in the laboratory was measured by the psychrometer method. A normal Lantana leaf showed a rel. humidity of 99.4% in the tissue, 91% in the stomatal openings and intercellular spaces, and 40-48% in the external air. A wilted leaf had the figures of 98.6, 65, and 40-48%, respectively. Similar results were obtained for bean, *Petunia*, and sunflower.— Auth. summ

12091. WRIGHT, KENNETH E. Transpiration and the absorption of mineral salts. Plant Physiol. 14(1): 171-174. 1939.—Plants of Phaseolus vulgaris were grown to the flowering stage in culture soln. Of several battery jars containing 6 plants each, 2 were selected that lost the same amt. of water over a 10-day period. One jar was placed in a high-humidity chamber, the other in a low-humidity chamber. After 96 hrs. the jars were refilled, and their position reversed for another 96-hr. run. Original and residual culture solns. were analyzed for P, Ca, NO₃, and K. In all cases high transpiration was accompanied by an increased absorption of these ions.—K. E. Wright.

WATER RELATIONS

12092. MES, MARGARETHA G., and GERTRUIDA M. BOT. Studies on the water relations of grasses. Correlations between sugar content and daily variations in water content of the leaves of Themeda triandra Forsk. S. African Jour. Sci. 35: 305-316. 1939.—Daily and seasonal variations in water and soluble sugar content of leaves of T. triandra, growing near Pretoria, were detd. Alcoholic extracts of the grass leaves or of the short stems were clarified with dibasic Pb acetate. The amt. of glucose and fructose was detd. by the modified Hagedorn-Jensen method. Sucrose was detd. after hydrolysis with invertase by the same method. The sugar content of the leaves was high in early spring. When the haulms and inflorescences began to develop, the sugar content of the leaves suddenly decreased; the sugar had been transported to the stems and developing haulms. During the formation of the seeds and also later in summer, sugar content again increased in the leaves and decreased in the stems. Towards the end of the growing season the sugar again decreased in the leaves, due probably to a decrease in the assimilatory activity. The low sugar content found at certain stages in the growth of the plants apparently influences water intake by the roots. Low sugar content was always correlated with an increase in the difference between the daily maximum and minimum water content of the leaves. Haulm formation was associated with a low sugar content and a strong variation in the daily water content. The lowest sugar content and strongest variation in daily water content were found towards the end of the season. The highest sugar content and smallest variation in daily water content were found at the beginning of the growing season.-Authors

12093. TONZIG, SERGIO. La distribuzione e la funzionalita dell'acqua nella cellula vegetale. [Distribution and functioning of water in plant cells.] Nuovo Gior. Bot. Ital. 45(4): 419-557. 27 fig. 1938(1939).—The water of plant cells exists in 4 types: (a) "reserve water," i.e., that which may be lost without appreciably affecting cell activity; (b) that which is necessary for proper cell functioning but which gradually diminishes as a normal physiological process during the progressive dehydration which accompanies ripening; (c) that which is necessary for cell activity but which becomes greatly reduced in amt. with transition of plants to the dormant period; and (d) that which is associated either physically or chemically with non-living portions of the cell and which may be reduced in amt. only under high temps. Exptl. studies determined differences in water content of plant parts in states of activity and of dormancy, the materials being root of carrot, seeds of horse-chestnut, buds of walnut, young branches of Amorpha fruticosa, cataphylls and normal leaves of Narcissus, fruits of plum, peach, and apple. Samples were dried under various treatments and at different temps. These extensive studies do not admit of summarization. The author decides that the plant contains: (1) intercellular water, (2) water dispersing the colloidal constituents of the cell membrane, (3) water of the vacuoles, (4) plasmatic water in cells which are (a) active and (b) latent, (5) water bound to non-living cell constituents. Different proportions of the author's "muco-proteid" in the various parts of cells and of tissues control loss of water not only in exptl. studies but regulate water economy of the living plant, especially under xeric conditions.—F. Ramaley.

RESPIRATION

12094. FIDLER, J. C. The loss of acid from oranges stored in air and in nitrogen. [Gr. Brit.] Dept. Sci. and Indust. Res. Ann. Rept. Food Invest. Bd. 1937: 126. 1938.—The loss of acid from South African Valencia and navel oranges is the same in air and in N₂. Presence or absence of O₂ is similarly without effect on the loss of acid from oranges—I. C. Fidler

The loss of acid from South African Valencia and navel oranges is the same in air and in N₂. Presence or absence of O₂ is similarly without effect on the loss of acid from oranges.—J. C. Fidler.

12095. HULME, A. C. An apparatus for measuring the output of CO₂ by a sample of 2-4 Kg. of apple fruits. [Gr. Brit.] Dept. Sci. and Indust. Res. Ann. Rept. Food Invest. Bd. 1937: 133-136. 2 fig. 1938.—Describes an apparatus designed to enable changes in the N metabolism of the apple to be followed throughout the respiratory climacteric. The effect of "bulk" storage in accelerating onset of the climacteric was emphasized by the results.—A. C. Hulme.

12096. PHILIPS, W. R. Respiration curve for McIntosh apples. Sci. Agric. [Ottawal 19(8): 505-509. 1939.—Respiration studies on individual McIntosh apples at 55°F revealed only a falling trend during the 1st yr.'s work; investigations during the 2d yr.'s work showed that the senescent hump in respiration occurs at or just previous to the time of harvest. McIntosh apples store better and develop much higher quality if the senescent hump phase is passed on the tree. During the senescent hump phase McIntosh apples are more susceptible to methyl bromide and CO₂ injury.—W. R. Phillips.

12097. WALFORD, E. J. M. Studies of the tomato in relation to its storage. I. A survey of the effect of maturity and season upon the respiration of greenhouse fruits at 12.5° C. Canadian Jour. Res. Sect. C, Bot. Sci. 16(2): 65-83. 1938.—Tomatoes were grown in the greenhouse at different seasons of the year, individual fruits were picked at various stages of maturity and continuous records of their respiration obtained at 12.5°C. The fruits of the late spring and summer went through the customary series of extensive changes in respiration rate as they ripened at the low temp., and exhibited the lack of durability normal to this fruit; the fruits of the late autumn, winter and early spring, if picked before the external appearance of red pigment, passed into a stable state in which ripening proceeded with but little change in respiration rate and with greatly prolonged life at 12.5°C.—Auth. abst.

NITROGEN METABOLISM

12098. BURSTRÖM, HANS. Über die Schwermetallkatalyse der Nitratassimilation. Planta 29(2): 292-305. 2 fig. 1939.

—The assimilation of aseptic wheat roots grown in solns. free from heavy metals was observed. NO₃ is assimilated in the

presence of Mn by entire roots and by root pulp. Fe may act as a substitute but this is ascribed to its action on respiration and ion intake. Fe is detrimental on entire roots in the presence of Mn. Mn and not Fe is believed to catalyze the NO₃ assimilation.—B. R. Nebel.

12099. GASKILL, JOHN O., and JOSEPH C. GILMAN. Role of nitrogen in fungous thermogenesis. *Plant Physiol.* 14(1): 31-53. 1939.—The influence of additions of asparagine, NH₄Cl, monoammonium phosphate, (NH₄)₂SO₄ and Ca(NO₃)₂ on thermogenesis and loss in dry weight of corn-cob meal cultures of Aspergillus flavus, A. terreus, Penicillium oxalicum and Rhizopus tritici is reported. The 5 forms of N each stimulated both thermogenesis and loss in dry weight when added to cultures of the first 3 fungi. With Rhizopus tritici, all forms of N except the nitrate markedly increased thermogenesis, but only asparagine inmarkedly increased thermogenesis, but only asparagine increased the dry-weight loss. Asparagine was found to be most generally suitable for the 4 fungi employed. The highest temp. recorded—49.25°C—was reached in cultures of A. flavus and A. terreus when supplied with asparagine. This temp. was 21.5°C above cultures containing no added N. The greatest loss in dry weight, in 28 days, in the expts. reported, was 16.95% in cultures of A. terreus supplied with asparagine. N additions ranging from 0.01 to 0.10 g. per 100 g. of dry cob-meal generally resulted in progressive increases in thermogenesis in cultures of A. flavus. The average maximum rise in temp. above the controls for addiaverage maximum rise in temp. above the controls for additions of asparagine, monoammonium phosphate and $\operatorname{Ca}(NO_3)_2$ —at the rate of 0.00, 0.01, 0.05, 0.10 g. per 100 g. of meal—were 6.67°, 7.67°, 15.25° and 20.25°C respectively. Additions greater than 0.10 g. up to 3.2 g. did not appreciably increase thermogenesis. Use of 3.2 g. N, as monoammonium phosphate and $\operatorname{Ca}(NO_3)_2$, resulted in an average maximum rise of only 11.38°C. Progressive increases in dry-weight loss in cultures of A flavous followed the larger dry-weight loss in cultures of A. flavus followed the larger additions of asparagine, monoammonium phosphate and $Ca(NO_3)_2$, respectively, up to 1.2 and 1.6 g. per 100 g. of dry meal.—J. C. Gilman.

12100. STEINBERG, ROBERT A., and JOHN D. BOWL-ING. Optimum solutions as physiological reference standards in estimating nitrogen utilization by Aspergillus niger. Jour. Agric. Res. 58(10): 717-732, 1939.—Yield curves with graduated quantities of N were obtained with A. niger grown in optimum nutrient solns, for 4 days at 35° C, 45% of the duplicate cultures agreed to within $\pm 1\%$, 68% to within $\pm 2\%$, 82% to within $\pm 3\%$, and 95% to within \pm 5%. Yields could be verified to within \pm 5% on repetition. Growth with NH₄NO₃ was studied at 3 levels of carbohydrate nutrition and was compared with growth obtained with NH₄Cl and with NaNO₃. The growth and total-N curves obtained with 2.5, 5, and 7.5% of sucrose were found to be proportional and identical in form when superimposed. Other results for the 3 solns, were also practically identical. At intermediate N cones., NH₄Cl gave lower and NaNO₃ still lower yields than did NH₄NO₃. Total N in the mycelial felts grown with NH₄NO₃ increased linearly with increasing concs. of N. Values for total N in the felts could be computed within the limits of accuracy for the chemical determinations. The assumption was made that the fungus invariably contained 2% of protoplasmic N and that the balance of N supplied was partitioned between the organism and the soln. similarly to the distribution of a dissolved substance between 2 immiscible solvents. The values of yield curves with NH₄NO₃ could not be duplicated by computation with the Mitscherlich equation of growth.— R. A. Steinberg.

PIGMENTS

12101. GERTZ, OTTO. Über künstlich erzeugte intrazellulare Anthochlorkörper. Bot. Notiser 1939(1): 198-206. 14 fig. 1939.—Color pigments of the anthochlor group, closely related to anthocyans, were examined on several plants, such as spp. of Coreopsis, Thelesperma filijolium, Bidens anthemoides, Cosmos sulphureus, Dahlia variabilis, Antirrhinum majus et al. Anthocyan bodies were precipitated with a lead acetate soln. Anthochlor bodies were precipitated also with a lead acetate soln. but on different plants. On certain plants ammonium carbonate solns. precipitated anthochlor bodies. Intracellular crystals of antho-

chlor were precipitated with glycerine on Coreopsis flowers. Drawings are included, showing variation in construction of the bodies according to location on the plants.—T. R.

Swanback.

12102. SEYBOLD, A., und K. EGLE. Zur chromatographischen Methode der Blattpigmente. Planta 29(1): 114-118. 1938.—The material is extracted after grinding with quartz sand with methanol under addition of benzene. For adsorption a column of powdered sugar is used. The Zeiss Pulfrich photometer was employed. A comparison of results was made of the method after Spohn, after Winterstein and Stein and the benzene-methanol method.—B. R. Nebel.

ENZYMES

12103. BREDERECK, HELLMUT, GOTTFRIED CARO, und FRIEDRICH RICHTER. Über die fermentative Aufspaltung der Hefe- und Thymonucleinsäure (Nucleinsäuren, X.). Ber. Deutsch. Chem. Ges. 71B: 2389-2391. 1938.—An enzyme preparation from sweet almonds, known to contain a polynucleotidase and a nucleotidase, was allowed to act on yeast nucleic acid and on thymonucleic acid in acid medium (pH 4.9-5.1). Both polynucleotides were hydrolyzed to nucleotides, and these in turn, and with about the same velocity, thus showing that these substances are hydrolyzed by the same enzymes and that they have the same structure fundamentally.—E. J. Witzemann.

12104. COUCH, JAMES F., and REINHOLD R. BRIESE.

The destruction of hydrocyanic acid by prunase and the influence of sugars on the reaction. Jour. Washington Acad. Sci. 29(5): 219-221. 1939.—In the absence of a preservative such as HgCl₂ prunase accelerates the decomposition of HCN in water soln. Dextrose and sucrose neutralize this action

but only after some time has elapsed.—Authors.

12105. DAVID, ROGER. L'influence des enzymes sur la germination de Pisum sativum. Compt. Rend. Soc. Biol. 129(26): 274-276, 1938.—Pepsin and the pancreatic enzymes stimulated germination feebly in 0.25-0.5% conc. In 0.5-1.0% conc. there was a definite stimulation. Diastase slightly

inhibited germination.—J. T. Myers.
12106. SPOEHR, H. A., and HAROLD W. MILNER. Starch dissolution and amylolytic activity in leaves. Proc. Amer. Phil. Soc. 81(1): 37-78. 1939.—More precise knowledge of the conditions affecting certain enzymes in the living leaf is of importance for an understanding of the processes resulting in the accumulation and disappearance of the products of photosynthesis. Amylase deserves special consideration, because starch is the first visible product of photosynthesis and also serves as transitory reserve food material. Certain leaves can undergo starch dissolution in an atmosphere free of O2, but this activity, under these conditions, is slower than in normal air. Starch dissolution does not occur in leaves which have been killed by means which do not destroy the enzyme. Higher cones. of CO₂ retard starch dissolution of leaves. Comparative determinations of the amylolytic activity of several spp. of leaves show great variation, and also considerable range in the pH of maximum activity of different spp. Both starch dissolution and amylolytic activity are accelerated with the loss of water from the leaves. Also, with decreased temps. some leaves exhibit an increased amylolytic activity and, in some cases, starch dissolution is accelerated.—From auth. abst.

TOXICITY

12107. COMMONER, BARRY. The effect of cyanide on the respiration of bakers' yeast in various concentrations of dextrose. Jour. Cell. and Comp. Physiol. 13(2): 121-138. 1939.—Suspensions of bakers' yeast were prepared by a constant culturing method, and the rate of respiration measured in various mixtures of dextrose and KCN in Warburg respirometers. In the absence of cyanide, the respiration rate is increased by the addition of dextrose up to a conc. of about 0.008 M. At higher cones, the rate is not increased above the maximum value obtained in 0.008 M dextrose. The rate in 10⁻⁷ M KCN is always at the maximum level regardless of dextrose conc. This conc. of KCN evidently causes the saturation of the dextrose dehydrogenase in all dextrose concs. Concs. of KCN greater than 10⁻⁷ M inhibit the respiration only when the dextrose conc. exceeds a critical value. This critical dextrose conc. decreases as the

KCN conc. is increased. The rate becomes independent of the dextrose conc. above the critical conc. Thus the % inhibition produced by a given conc. of cyanide depends on the dextrose conc. and is thereby a function of the original cyanide-free rate. The significance of the Warburg inhibition equation is demonstrated in terms of the above effects. The rate of respiration does not vary continuously with variation in the activity of the oxidase and dehydro-genase, and these parts of the Warburg-Keilin system are not in a homogeneous kinetic equilibrium.-Auth. (courtesy Wistar Bibl. Serv.).

12108. CRAFTS, A. S., and R. S. ROSENFELS. Toxicity studies with arsenic in eighty California soils. Hilgardia 12(3): 177-200. 2 fig. 1939.—Increasing use of As in herbicides, insecticides, and soil sterilants presents important problems to farmers and soil investigators. A knowledge of soil factors controlling toxicity of As in soils is essential to the continued and successful use of this chemical. Tests on 80 California soils show that As toxicity following the initial application is high in sandy soils and low in clays. Repeated cropping of the test cultures shows that As toxicity decreases with time. Whereas, in the first test no plants grew in cultures having more than 1050 p.p.m. As₂O₃, by the 7th crop plants survived in those originally containing 3000 p.p.m. For soil sterilization, As equivalent to 2 lbs. per sq. rod is required on coarse gritty soils; 4-6 lbs. on loams, silt loams and some clay loams; and 8-12 lbs. on clays and adobe clays. Red soils or recent alluvial soils from sedimentary rocks require approx. twice this dosage. Light annual applications or the use of dry As₂O₃ with about 10% NaClO₃ may be less wasteful on soils that

about 10% NaCiO₃ may be less wasterul on solis that render much As unavailable. Heavy leaching reduces the conc. of available As in the soil.—A. S. Crafts.

12109. GREEN, LOWELL F., JAMES F. McCARTHY, and C. G. KING. Inhibition of respiration and photosynthesis in Chlorella pyrenoidosa by organic compounds that inhibit compare actalysis. Lower Riol Chem. 128(2). that inhibit copper catalysis. Jour. Biol. Chem. 128(2): 447-453. 1939.—A series of organic compounds characterized by their activity as copper "poisons," thiourea, 8-hydroxyquinoline, allylthiourea, Na diethyldithiocarbamate, K ethyl xanthate, and salicylaldoxime all exhibited marked inhibition of photosynthesis and respiration in C. pyrenoidosa. The inhibition of both respiration and photosynthesis by thiourea and salicylaldoxime was reversible, being fully restored after 4 hours' dialysis and centrifuging. The ascorbic acid content

of centrifuged cells was 0.17 mg. per ml.—Authors.
12110. HWANG, LIANG, and L. J. KLOTZ. The toxic effect of certain chemical solutions on spores of Penicillium italicum and P. digitatum. Hilgardia 12(1): 1-38. 3 fig. 1938. —The toxicity of various chemical solns, at several temps, and concs., to *P. italicum* and *P. digitatum*, was detd. by immersing the spores for certain time periods and comparing their subsequent viability with that of untreated spores. Thorough prewetting of the spores, such as is effected by immersion in a nontoxic soap soln., is requisite to the accurate determination of toxicity of treating solns. In studying time-temp, effects on toxicity, an important source of error was eliminated by centrifuging the spore suspension just before the end of the chosen time period in an incubator at the temp. of the treating soln., decanting the soln., and replacing with water at room temp. Viability index as a measure of toxicity was calculated by dividing the average number of colonies per cc. grown in dilution plates by the average number of spores per cc. as detd, by microscopic count. To make all expts. comparable, the viability index for spores in water suspension in each expt. was placed on a basis of 100 and the results from all treatments of a single expt. calculated to this basis. Distilled water at 120° F for 5 min. killed 90% of the spores. Tests in which 6% borax at 110° F was used for 2, 4, 6, 8, 10, 12, 14, and 16 min., and at room temp. (66-72°), 80°, 100°, 110°, and 120° F for 5 min., and at concs. of 4, 6, 8, 10, and 12% for 5 min. at 110° F, showed, as would be expected, that the longer the exposure to, the higher the temp. of, and the greater the conc. of the chemical, the more effective was the soln. in reducing viability. Similar relations were found with Na₂CO₃ and Methor. Toxicity of the several solns to spores of *P. italicum* and *P. digitatum* was more dependent on temp. than on conc. of the chemicals or the period of immersion. A 5-min. exposure at 120° F in a 6% boraxboric acid mixture, or 6% Metbor, or 0.4% chloramine-T, or in 6% Na₂CO₃, was lethal to the spores of both fungi. Details of the effects of the several temps. may be secured from tables 2 and 3. A saturated soln. of dinitro-o-cyclo-hexylphenol and a 1% proprietary washing powder used at room temp. for 2 min. and 5 min., respectively, had only a slight inhibitory effect on spore germination. A 5-min. exposure of the spores in 6% NaHCO₃ at 86°, 100°, 110°, and 120° F showed no advantage of the chemical over water. At 86° F, immersion in a 10% soln. of NaHCO₃ for 5 min., or in one of 6% for 10 min., had but little effect on the spores. Two-minute exposures to 0.4, 0.6, and 1% solns. of NaOCI were fatal to the spores of both fungi. Excluding the NaOCI solns. which killed all the spores of both fungi, the 3 most efficacious solns., when used at 100° F and below for 5 min., were 6% Na₂CO₃, 0.15% Na o-phenylphenate and 6% borax; at 110° and 120° F the 3 most toxic were 0.4% chloramine-T, 6% Na₂CO₃, and the 6% mixture (2:1) of borax and boric acid.—Authors.

12111. ROSENFELS, R. S., and A. S. CRAFTS. Arsenic fixation in relation to the sterilization of soils with sodium arsenite. Hilgardia 12(3): 201-229. 1939.—As fixation was detd. in 33 California soils comprising a wide range of textural grades. The method was to apply Na arsenite in a volume of water sufficient to make a 1:1 water extract and determine the conc. of As by the Gutzeit method in the filtered extract after a given period of time. In general the percentage of a given application of Na arsenite fixed was highest in the heavy soils, lower in the soils of intermediate grade, and lowest in the light soils. Since heavy soils require the most and light soils the least As to sterilize them, toxicity can be largely accounted for in terms of fixation. As fixation proceeds at different rates in different soils. Decreasing the moisture content of a soil below field capacity has no effect upon toxicity. Exptl. determinations of As conc. at various water contents, application constant, suggest that this is because, within the range of sub-lethal applications, the conc. remains about the same in some soils and in others decreases as water content diminishes. As concs. at applications other than those made experimentally were calculated by the equation $\log C = -3/2 \log (F - x) + \log K$, wherein C represents the conc. and x the amt. of As fixed by unit weight of soil, and F and K are constants. Through these calculations the relation of fixation to toxicity, above indicated, was corroborated.—R. S. Rosenfels.

APPARATUS, METHODS

12112. CHAMOT, E. M., and C. W. MASON. Handbook of chemical microscopy. Vol. I, 2nd ed. xvi+478p. 165 fig. John Wiley and Sons: New York, 1938.—In its present edition this volume has been considerably expanded and rewritten in certain sections, such as those dealing with the study of crystals and cryptocrystalline aggregates, fibrous materials, particle size, illumination, photomicrography, and preparation technics; and important references, indicative of the trend of microscopical advances in these fields, up to July 1938, have been added.—Courtesy Exp. Sta. Rec.

CHEMICAL CONSTITUENTS

12113. AKASI, SYUZO. Über die Reindarstellung der Schimmelpilz-Nukleinsäure und deren Natur. Jour. Biochem. [Tokyo] 29(1): 21-29. 1939.—The nucleic acid obtained in yields of 0.9% from Penicillium glaucum was identical with yeast nucleic acid. Analysis showed 8.53% P. 15.43% N and purin N:total N 65.3%.—A. Arnold. 12114. EDGECOMBE, A. E. Differential distribution of

ash in stems of herbaceous plants from base to tip. Amer. Jour. Bot. 26(5): 324-328. 1939.—The ash content and the water content were obtained from apical, basal and middle

sections of the stems of tobacco, cabbage, tomato, Bryophyllum pinnatum. An increasing ash gradient on the basis of dry weight, a decreasing ash gradient on the basis of wet weight, and an increasing water gradient on the basis of wet weight existed along the stem axes.—A. E. Edgecombe

12115. ISHERWOOD, F. A. Reducing substances present in potatoes. [Gr. Brit.] Dept. Sci. and Indust. Res. Ann. Rept. Food Invest. Bd. 1937: 184-185. 1938.—The amount of free tyrosine in 2 samples of potatoes after different periods of storage is about 0.15% of the fresh weight in each sample.—F. A. Isherwood.

12116. WADLEIGH, CECIL H., and JOHN W. SHIVE. Organic acid content of corn plants as influenced by pH of substrate and form of nitrogen supplied. Amer. Jour. Bot. 26(4): 244-248. 1939.—Oxalic, malic, citric, and total organic acids were determined in maize grown at various pH levels, the cultures of one series being supplied with nitrate N only and those of the other with both nitrate and ammonium N. The total organic acid content of corn plants varied between 0.7 and 1.0 milli-equivalents per g. dry weight. Oxalic and citric acids were present in small amts., varying from 0.05 to 0.27% of dry weight. Malic acid was present in appreciable quantities, varying from 0.8 to 1.8% of dry weight. Only 25-30% of the total organic anions were accounted for. The organic acid content of the corn plants increased with increase in pH of the substrate. Plants grown with ammonium and nitrate N contained less organic acids and had a lower base content than plants grown with nitrate as the sole source of N. The data secured do not show any definite interrelationship between soluble iron content and organic acids in corn plants. Corn plants under treatments here considered were relatively low in both organic acids and soluble iron.—Auth. summ.

MISCELLANEOUS

12117. DAY, DOROTHY. Plant physiology in the women's colleges. Plant Physiol. 14(1): 179-181. 1939.—A comprehensive picture of the women's colleges shows 1-2 courses of 1-2 semesters for a few upper class students. Individual work is the rule. Records are informal, but accuracy and proper discussion are emphasized. The living plant is used more than physical and chemical illustrations. Prerequisites emphasize the botanical background more than the chemical. Students are usually majors in the botany department, not in horticulture. New aspects of physiology are presented although standard expts. are the rule for basic problems. Emphasis is on teaching the student well rather than the subject thoroughly.—D. Day.

well rather than the subject thoroughly.—D. Day.

12118. ROBERTS, O., and J. DOYLE. The pH of conifer leaves in relation to systematy. Sci. Proc. Roy. Dublin Soc.
21(59): 655-674. 1938.—The pH of extracted leaf sap in 90 spp. from about 40 genera of conifers was measured using the H-electrode, the quinhydrone electrode not being suitable for conifer saps. Individual and habitat variations were small, ±0.3 pH as maximum. No relation was observed between these variations and habitat conditions of soil, altitude, or light. Seasonal changes were also small, but seemed related to seasonal rhythms in metabolism, particularly by a fall in pH in many spp. before the onset of spring activity. Generic groups of natural affinity tend to lie within certain narrow pH ranges, as shown by the complete families of the Pinaceae, Taxaceae, and Araucariaceae, and the main bulk of the Cupressaceae and the Podocarpaceae. Specialized genera may deviate from the family range, i.e., Callitris and Podocarpus. The Taxodiaceae, systematically probably a polyphyletic group, show a wider and less regular distribution of pH among the genera.—J. Doyle.

PHYTOPATHOLOGY

FREEMAN WEISS, Editor

(See also in this issue Entries 10779, 10816, 11616, 11784, 11811, 11814, 11945, 11987, 12074, 12110, 12179, 12196, 12198, 12231A)

DISEASES CAUSED BY FUNGI

12119. ELLIS, DON E. Ceratostomella ips associated with Ips lecontei in Arizona. Phytopath. 29(6): 556-557.

1939.—C. ips was found associated with I. lecontei attacking Pinus ponderosa in Arizona.—D. E. Ellis.

12120. HIRT, RAY R., and E. J. ELIASON. The de-

velopment of decay in living trees inoculated with Fomes pinicola. Jour. Forestry 36(7): 705-709. 1 fig. 1938.—One living tree each of Populus grandidentata, Tsuga canadensis, Picea rubra, Betula lutea, Abies balsamea, Pinus strobus, and Fagus grandifolia, inoculated with mycelia of Fomes pinicola isolated from various tree hosts, was felled 10 yr. later, cut into sections, and the development of decay followed. The fungus had demonstrated its ability to cause decay in both coniferous and hardwood hosts regardless of its source, the maximum rot occurring in red spruce, where it extended vertically for ± 8 ft.—F. V. Rand (courtesy of Exp. Sta. Rec.)

12121. IWATA, Y. Pseudoperonospora cubensis (Berk. et Curt.) Rostow. on Trichosanthes japonica Regel. [In Jap.] Ann. Phytopath. Soc. Japan 8(4): 336-338. 2 fig. 1939.—First

record on T. japonica. Symptoms observed on the new host plant, morphology of the fungus, and positive results obtained in cross infection expts. between T. japonica and cucumber or other cucurbits, are reported.—Y. Tochinai.

12122. KASAI, M. The staining fungus, Graphium rubrum Rumbold, on Chinese bandoline wood. [In Jap.] Ann. Phytopath. Soc. Japan 8(4): 327-330. 3 fig. 1939.—G. rubrum caused grayish staining on Chinese bandoline wood. Machines thumbergii (first record of this fungus in wood, Machilus thunbergii (first record of this fungus in Japan and on the *Machilus* wood). Morph, and cultural characters of the fungus are reported.—Y. Tochinai.

12123. LAUBERT, R. Eine neue Krankheit von Alyssum saxatile. Kranke Pflanze 15(11): 200-201. 1938.—A record is given of the presence and spread of Peronospora galligena on Alyssum saxatile in Germany. Reference is made to the description of the disease by Blumer in Switzerland

(1937).—R. Weindling.

12124. MACHACEK, J. E., and F. J. GREANEY. The "black-point" or "kernel smudge" disease of cereals. Canadian Jour. Res. Sect. C, Bot. Sci. 16(2): 84-113. 1 pl., 1 fig. 1938.—A seed disease ("kernel smudge") of wheat, rye, and barley, characterized by a brown or black discoloration of the kernel, particularly in the region of the embryo, frequently reduces the seed value and usually the sales value of affected grain. Alternaria tenuis, A. peglioni, Helminthosporium sativum, and H. teres are the fungi chiefly associated with it in Manitoba. The kernel smudge caused by Alternaria cannot be accurately distinguished from that caused by *Helminthosporium* without a laboratory examination of the seed. Extensive trials with wheat demonstrated that the Alternaria type of kernel smudge does not greatly affect seed germination, plant emergence, intensity of root rot, and yield in the subsequent crop, but *H. sativum* reduces germination, seedling emergence, and yield, and causes an increased amt. of root rot. Infection of the kernel is by air-borne spores which are usually deposited in the largest numbers at about the time the kernels are maturing. The disease does not result in shrunken kernels; the largest kernels are frequently infected, the small, shrunken ones usually free from the disease, apparently because the large kernels force open their covering glumes, thus affording access to air-borne spores, whereas the glumes of small kernels remain closed. The seed value of grain attacked by the virulent (H. sativum) type of kernel smudge was increased considerably when such grain was dusted with suitable organic mercury dusts (ethyl mercury phosphate or methyl mercury nitrate). Dusting with CuCO₃ was ineffective. The development of kernel smudge in the maturing crop was not prevented by dusting the growing plants with sulphur.—Auth. abst.

12125. MIELKE, J. L. Spread of blister rust to sugar pine in Oregon and California. Jour. Forestry 36(7): 695-701. 2 fig. 1938.—Known on the West Coast since 1936, a rather wide spread of Cronartium ribicola to Ribes occurred in California during 1937, extending southwards for about 125 miles both in the coastal and Sierra Nevada mountains. The present known distribution of this rust in California and Oregon is discussed (with map), together with its behavior on *Pinus lambertiana* which, according to present evidence, is a highly susceptible species.—F. V. Rand (cour-

tesy of Exp. Sta. Rec.).

12126. SEELER, EDGAR V. Jr. Thyronectria denigrata (Winter) Seaver, the cause of disease in Gleditsia. Jour. Arnold Arboretum 20(1): 114-115, 1939.—T. denigrata is shown to be the cause of a wilt disease and of canker in Gleditsia in Massachusetts.—A. Rehder.
12127. THOMPSON, A. A root disease of the durian tree

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caused by Pythium complectens Braun. Malayan Agric. Jour. 26(11): 460-464. 1 pl. 1938.—A root disease of Durio zibethinus, growing in poor soil at Singapore, and responsible for the death of the trees, was proved to be due to P complectens, a facultative parasite of the roots of trees growing in soil which has declined in fertility. The fungus is a wound parasite capable of causing patch canker of the stem. Uprooting and burning of diseased trees, isolation by trenches, manuring, reconditioning of the soil and prevention of erosion are recommended.-W. D. Pierce.

12128. TOMPKINS, C. M. Charcoal rot of sugar beet. Hilgardia 12(1): 73-81. 4 fig. 1938.—A crown rot of sugar beet, caused by Macrophomina phaseoli (Maubl.) Ashby, is described. The disease occurs only in the interior valleys of California and is apparently dependent upon high temps. Infection of sugar-beet roots and seedlings was obtained in the laboratory with different isolates of the sclerotial form of the fungus from sugar beet. Infection of sugar-beet roots was also obtained in the laboratory with isolates from other hosts. The optimum temp. for growth of one of the isolates from sugar beet was approx. 31° C.—C. M. Tompkins.

12129. TRUE, R. P., and STANLEY S. SLOWATA. Scouting and sampling elms with symptoms commonly associated with the Dutch elm disease as an aid in eradicating Ceratostomella ulmi. *Phytopath.* 29(6): 529-537. 1939. In the summers 1936 and 1937, respectively, 2000 and 4000 elms in New Jersey were observed bi-weekly for development of external symptoms commonly associated with the Dutch elm disease. 12-20% showed external symptoms: 3-10% of all trees in those plots whose symptom trees were carefully sampled also showed internal symptoms and required culturing for diagnosis, and 0.007 to 2.3% were found affected by the Dutch elm disease. Symptoms caused by Ceratostomella ulmi appeared in highest numbers and percentages in early summer. Among 419 elms cut, carefully examined for internal symptoms and cultured, 12 trees which had shown no external symptoms were found infected by C. ulmi.—R. P. True.

12130. VERONA, O., and R. CIFERRI. Mycotorula albicans associated with a disease of carrot. Mycopathologia 1(4): 273. 1939.—M. albicans was isolated from rotted car-

rots.-C. W. Emmons.

12131. WALTER, JAMES M. Observations on fructification of Ceratostomella ulmi in England. Phytopath. 29(6): 551-553. 1939.—Coremia and perithecia of C. ulmi were found in great abundance in the dead, dying, and fallen elms in England. The most bountiful development of these structures was found on the xylem surface of elm from which the bark had just begun to loosen, but they develop commonly in the galleries of the bark beetles Scolytus scolytus and S. multistriatus. Perithecia were most numerous on surfaces that had produced stands of coremia 2 to 4 weeks previously. Logs in contact with moist soil yielded more extensive stands of coremia and perithecia than did standing dead trees. Fresh coremia could be found at any time of the year, but, during the 3 years of the observations, development of perithecia apparently ceased during Nov. and did not begin again until about Mar. 15.—J. M. Walter.

VIRUS DISEASES

12132. ABBOTT, E. V. Chlorotic streak of sugar cane. Sugar Jour. 1(2): 16, 17, 20. 1 fig. 1938. Also in Sugar Bull. 16(20): 4, 5. 1 fig. 1938.—For this disease, believed to be due to a virus and reported for the first time in Louisiana in 1937, the author discusses the appearance and effect on the plant, possible source and present known distribution, importance, how it spreads, and suggested control measures.

-Courtesy Exp. Sta. Rec. 12133. BENNETT, C. W. The nomenclature of plant viruses. Phytopath. 29(5): 422-430. 1939.—A general discussion of methods of classification and systems of nomenclature proposed for use with plant viruses.—C. W. Bennett.

12134. JOHNSON, J. Plant virus inhibitors produced by microorganisms. Science 88(2293): 552, 553. 1938.—The micro-organisms used to inactivate tobacco-mosaic virus (e.g., Aerobacter aerogenes and Aspergillus niger) differ from most micro-organisms with respect to type of inactivation; they produce something in culture which, when added to an extract of the virus, is immediately inhibitory to its infectivity, but not toxic to living matter in the usual sense. The immediacy of the effect suggests that it cannot be attributed to decomposition or digestion. The known properties of the inhibitor are briefly noted.—Cowtesy Exp. Sta. Rec.

12135. RISCHKOV, V. L., and E. P. GROMYKO. A new method for the purification of the tobacco mosaic virus. Doklady Akademű Nauk SSSR, Novaia Seria (Compt. Rend. Acad. Sci. URSS Nouv. Sér.) 19(3): 203-205. 1938.— The method described is based on the adsorption of tobacco mosaic virus by benzoic acid.—Courtesy Exp. Sta. Rec.

mosate virus by behavior acid.—Courtesy Exp. Sca. Rec. 12136. SHEFFIELD, F. M. L. Micrurgical studies on virus-infected plants. Proc. Roy. Soc. [London] Ser. B 126(845): 529-538. 1 pl. 1939.—Cells of virus-infected plants were examined by micromanipulative methods. The pH of the cell contents was found to be the same in diseased and in healthy plants. The non-crystalline intracellular inclusions of aucuba mosaic disease of tomato disintegrate immediately on slight pressure or on pricking. They are almost unaffected by acids from pH 7 to 2.2. They break down if the osmotic pressure is reduced below 0.7 M but can be isolated into solns. of 0.1 M. These inclusions contain virus but virus may also be dispersed through the cell. The striate material of tobacco and enation mosaics cannot be isolated, as immediately it is touched with a micro-needle it breaks down into needle-like fibers.—Auth. summ.

12137. SILBERSCHMIDT, K., e M. KRAMER. Contribuição para o conhecimento do mosaico do fumo e dos seus hospedeiros selvagens no Brasil. [Contribution to the knowledge of tobacco mosaic and of its wild host-plants in Brazil.] Arq. Inst. Biol. [São Paulo] 9: 1-20. 4 pl. 1938.—
The authors collected material of 8 mosaic-diseased tobacco plants from different parts of the State of São Paulo, to determine whether they contained the same virus. Healthy indicator-plants (especially Nicotiana glutinosa and N. rustica) were inoculated with the sap of those plants and have shown that all the saps examined contained the true tobacco mosaic and the quantitative differences in their activity were great enough to indicate the presence of 3 different strains of this virus. Expts. were next performed on the susceptibility to mosaic disease of the following weeds of the tobacco fields in Brazil: Solanum reflexum, S. platanifolium, S. aculeatissimum, S. mammosum, S. atropurpureum, S. sisymbrifolium and S. nigrum, which exhibited different types of symptoms. S. variabile is abundant in the neighborhood of São Paulo, and acts as a carrier of the disease.—K. Silberschmidt.

12138. STEVENS, H. E. Avocado sun-blotch in Florida. Phytopath. 29(6): 537-541. 1 fig. 1939.—A report on the occurrence and identity of sun-blotch on a group of commercial avocado trees in Florida. Only Taft trees previously topworked to Nabal and Taylor vars. were affected. The source of this infection is obscure unless the Taft var. served as a latent carrier. Sun-blotch has occurred previously in Florida only in sporadic cases.—H. E. Stevens.

ously in Florida only in sporadic cases.—H. E. Stevens.

12139. STODDARD, E. M. The present status and some observations on the "X" disease of the peach in Connecticut. Proc. Connecticut Pomol. Soc. 47: 95-97. 1937(1938).—This disease is causing more severe damage each year in infected orchards, and the number of infected orchards is increasing. There is very little hope of a tree recovering when once infected. The authors have never found X-diseased peach trees that were not associated with diseased choke cherry trees. Other pertinent theoretical and concrete data are briefly noted.—Courtesy Exp. Sta. Rec.

briefly noted.—Courtesy Exp. Sta. Rec.

12140. YU, T. F. Mild-mosaic virus of broad bean.

Phytopath. 29(5): 448-455. 1 fig. 1939.—A description of a previously undescribed virus and the symptoms produced on broad bean (Vicia faba) and several other leguminous plants. The virus is transmitted by Aphis rumicis and Macrosiphum pisi. It remains active for 3 hrs. at 22°-24° C, is inactivated at about 55°-60° C. It tolerates a dilution of 1:1500.—M. T. Cook.

12141. YU, T. F. A list of plant viruses observed in China. Phytopath. 29(5): 459-461. 1939.—A list of viruses observed on 34 spp. of economic plants.—M. T. Cook.

PARASITISM AND RESISTANCE

12142. AJROLDI, P. Influenza di micromiceti sulla germinazione e sullo sviluppo di piante ortensi. [Influence of micro fungi on germination and development of horticultural plants.] Italia Agric. 75(8): 579-587. Illus. 1938.— The effects of culture decoctions and mycelial extracts of Fusarium bulbigenum var. lycopersici and Alternaria brassicae on the germinative power of seeds of tomato and cabbage were tested with negative results. Their absorption through the root system was harmful to seedlings, causing chlorosis, atrophy, and necrosis. The toxicity of culture media extracts increases with the age of cultures, but extracts from young mycelium are more toxic than from old colonies. The toxic effect has been attributed to the presence of purine bases.—R. Ciferri.

12143. BERGMAN, H. F. Observations on powdery mildew on cultivated blueberries in Massachusetts in 1938. Phytopath. 29(6): 545-546. 1939.—Pioneer is the most susceptible of the vars. now grown. Cabot and Wareham follow in the order named. Harding and Katherine appear to be the most resistant. Selection from crosses is suggested as a method of obtaining vars. more resistant to mildew.—
H. F. Bergman.

12144. GRAHAM, V. E., and L. GREENBERG. The effect of salicylic aldehyde on the infection of wheat by Pythium arrhenomanes Drechsler, and the destruction of the aldehyde by Actinomyces erythropolis and Penicillium sp. Canadian Jour. Res. Sect. C 17(2): 52-56. 1 fig. 1939.—Salicylic aldehyde, when added to soil at the rate of 50 p.p.m., seems to predispose wheat roots to attack by parasitic strains of P. arrhenomanes. A. erythropolis and a species of Penicillium have been found in soil from the healthy area of a field partially infected with Browning root rot. These organisms caused the disappearance of salicylic aldehyde in an artificial medium. Lack of activity on the part of such organisms in certain areas of a field may lead to an accumulation of salicylic aldehyde or products acting in a similar manner. This may be a predisposing factor in the appearance of Browning root rot caused by P. arrhenomanes.—Auth. abst.

12145. HAHN, GLENN GARDNER. Blister rust susceptibility studies of naturally pollinated seedlings of the immune Viking currant. Jour. Forestry 36(8): 737-747. 3 fig. 1938.—Though currants and gooseberries are known to be susceptible in general to Cronartium ribicola infection, 2 red currant garden vars. have been extensively studied and proved to be immune. In Germany, the Rote Holländische var. has been proved immune over a period of 5 yrs. For a longer period (1928-37) the author has demonstrated the related var. Viking to be also immune in Europe and N. America. Its seedlings, propagated from seed collected from spontaneously pollinated bushes growing both where the possibility of cross-pollination with susceptibles was not excluded and also where it seemed unlikely, produced a high percentage of rust-immune plants, and a small per-centage of susceptibles the majority of which were weak-lings. Among those with vigorous growth, 2 proved highly susceptible; the remainder were highly resistant. It is believed probable that a very small percentage of the seedlings are heterozygous, whereas the majority of the Viking seedlings must be homozygous, rust-resistance being a dominant character in the parent. There may be multiple factors involved in the inheritance of resistance. parentage of Viking is discussed, together with inheritance of rust-resistance in the var. and the possibilities of its inbreeding with other currants.—F. V. Rand (courtesy of Exp. Sta. Rec.).

12146. HEWITT, WM. B. Leaf-scar infection in relation to the olive-knot disease. Hilgardia 12(1): 39-71. 5 pl., 2 fig. 1938.—Natural infections in the region of the abscission zone of olive leaves with Bacterium savastanoi rarely occur before leaf fall. Most leaf scars are susceptible to infection immediately after leaf fall. The susceptibility dropped rapidly during the 1st day, and the scars became immune by the end of the 9th. The drop in susceptibility was much more rapid for scars kept in moist chambers than for those left outside. Microchemical studies of the abscission process of leaves and the healing of leaf scars showed that (1) no protective layer is formed in the

tissues before leaf fall, (2) immediately after leaf fall the scar is an open wound, (3) during the healing processes wound-gum is formed in the scar tissues and is followed by the development of a periderm, (4) and that the development of materials such as tannins, water-soluble gums, etc., apparently has no influence on infection. The use of India ink particles to trace the course of inoculum indicated that infection may depend upon the depth of penetration of the inoculum. Most infections in leaf scars were caused by bacteria that entered through the vessels. Those entering in this way were freed into the surrounding tissue when the vessels were slowly pulled apart by growth of the periderm. Pockets of bacteria formed in the tissue derived from the phellogen, and the greatest amount of cell proliferation occurred around these bacterial pockets.—W. B. Hewitt.

12147. MILLS, W. R. The influence of maturity of potato varieties upon their susceptibility to late blight. Amer. Potato Jour. 15(11): 318-325. 1938.—One set of potato plants of the vars. Triumph, Green Mountain, Katahdin, Smooth Rural, and an unnamed, late var. was artificially aged by receiving 9 hrs. of daylight per day, while a like set received normal daylight of from 12 to 15 hrs. When the short-day set had ceased foliage growth and was tubering, all plants were inoculated with Phytophthora infestans. Measurements of blight lesions showed that none of the mature plants was more susceptible than the immature ones. It is believed that potatoes usually do not blight in the field previous to flowering and tuber formation because weather conditions are unfavorable for the fungus previous to that time.—W. R. Mills.

12148. ROBERTSON, D. Varietal resistance of potatoes to the effects of eelworm infestation. Scottish Jour. Agric. 22(2): 172-174. 1939.—Four early and 4 late vars. were grown for 9 yrs. in soil infested with Heterodera schachtii. Epicure was claimed to be resistant to the results of eelworm infestation. It is suggested that a resistant strain of Epicure may have been discovered.—C. E. Foister.

12149. SANFORD, G. B. Studies on Rhizoctonia solani Kiihn. III. Racial differences in pathogenicity. Canadian Jour. Res. Sect. C, Bot. Sci. 16(2): 53-64. 1 pl. 1938.—Pathogenicity tests on potato stems were made of 133 isolates of R. solani. Of these, I14 were from random sclerotia on random tubers from 4 fields, 13 from lesions on potato stems, and 8 from single basidiospores. A number of tests were made in the laboratory at 17° and 23° C, in 2 contrasting types of artificially infested, unsterlized, virgin soil, which was maintained at opt. moisture content for disease expression. More of the isolates were pathogenic in the infertile podsol soil than in the fertile black loam. 18% of the isolates were of virulent rank in the latter soil, in contrast to 34% of them in the former one. Indications are that, under average soil conditions, approximately 20 to 50% of the isolates of R. solani from sclerotia on random tubers may be assigned to the zero and marginal classes of pathogenic rank, and that certain isolates were inherently very deficient in pathogenicity to potato stems, while others characteristically possess a high degree of virulence. The results of this study help to explain why the stems of a high percentage of plants from sclerotia-infested sets often escape with little or no infection in the field.—Auth. abst.

12150. SCHLEHUBER, A. M. Reaction of winter wheat to physiologic races of Tilletia levis Kuhn and T. tritici (Bjerk.) Wint. Washington State Coll. Res. Studies 6(2): 97, 98. 1938.—Part 1 deals with the inheritance in winter wheat of susceptibility to physiologic races of T. levis and T. tritici, and part 2 with physiological studies on the effect of bunt on wheat. The paper is an abstract of a doctor's dissertation.—Courtesy Ean Sta Rec.

dissertation.—Courtesy Exp. Sta. Rec.

12151. STAKMAN, E. C. Plant disease fungi constantly evolving new types. Science 88(2289): 438, 439. 1938.—This abstract of an address before the Nat. Academy of Sciences refers to the evidence obtained by research, particularly on the rust and smut parasites of plants, that in nature new strains of plant pathogens are constantly being evolved by mutation and hybridization. From a single cell of corn smut 162 strains were produced by mutation in artificial culture within a few months; more than a thousand types were produced among the progeny from the union of 2

individual germ cells. Reference is made to the recognition of more than 150 parasitic strains of stem rust of wheat by their effects on 12 vars. of wheat and to the indications that new parasitic strains are continually being produced by hybridization of existing forms on the barberry plant.—

Courtesu Exp. Sta. Rec.

Courtesy Exp. Sta. Rec.

12152. UMBREIT, WAYNE W. The growth of actinomycetes on different varieties of potatoes. Amer. Potato Jour. 15(12): 349-355. 1938.—No correlation between the ability of a given potato variety to support laboratory growth of actinomycetes and its resistance to scabbing could be demonstrated. Differences in the amt. of growth of actinomycetes on different potato vars. arose from causes other than the potato variety employed. This technique cannot be used as a test of susceptibility to scab.—W. W. Umbreit.

DISEASE CONTROL

12153. HEPTING, GEORGE H., and E. RICHARD TOOLE. The hemlock rust caused by Melampsora farlowii. Phytopath. 29(6): 463-473. 2 fig. 1939.—In certain nurseries in western N. Carolina some eastern hemlocks (Tsuga canadensis) had up to 82% of their 1938 shoots killed by a twig blight, proved by inoculations to be caused by the autoecious rust M. farlowii. Carolina hemlock (T. caroliniana) is much more resistant. In spraying expts. the most efficient control was obtained by spraying with lime-sulfur at the rate of 4 lbs. of the dry form to 50 gals. of water, once each week throughout May. Sprayed trees had 3% of their twigs killed, compared with 19% for unsprayed trees. The cost of spraying a 2 to 5 foot tree was 4/10 cent per tree per application.—Authors.

12154. JAHNEL, H. Eine Spritzaktion zur Bekämpfung des Spargelrostes. Kranke Pflanze 15(11): 195-199. 1938.— A successful cooperative campaign to control a rust epiphytotic was carried out in an asparagus-growing section of Saxonia, Germany, in 1938. Bordeaux was used in the proportion of 1:100 in water to prevent primary infection in May and June.—R. Weindling.

12155. KUNTZ, W. A., and G. D. RUEHLE. Control of melanose on citrus. Citrus Indust. 19(8): 3, 6, 7, 15, 18, 19, 22; (9): 11, 12. 1938.—As a disease of commercial citrus vars. in Florida it is believed that it cannot be entirely eliminated, the causal Phomopsis being always present and inducing varying degrees of damage from season to season. There are several strong modifying factors which may determine the relative severity among both seasons and groves. Avoidance of cold injury, "cropping strain," and severe scale infestations would apparently favor melanose control. There are also times and seasons when pruning is essential in lessening the abundance of the melanose fungus. The combined pruning and spraying of citrus trees will probably produce the best results from the standpoints both of the trees and of production of bright fruits.—Courtesy Exp. Sta. Rec.

12156. LARSON, R. H., A. R. ALBERT, and J. C.

12156. LARSON, R. H., A. R. ALBERT, and J. C. WALKER. Soil reaction in relation to potato scab. Amer. Potato Jour. 15(11): 325-330. 1938.—Results of soil treatments in Wisconsin potato fields confirm previous evidence that scab (Actinomyces scabies) is reduced by increasing soil acidity. Adjustment of the soil to the desired moderately-acid reaction by means of S applied broadcast and well disced in amts. from 700 to 3,000 lbs. per acre consistently reduced the incidence of infection in susceptible Irish Cobbler and Katahdin (the former used in all tests except in one location in 1936), in silt, sandy loam, and muck soils. The causal organism was not eliminated by maintenance of pH below 5 over a 2-year period. No decline in amount of scab followed the use of lime, even in quantities too great for economic agricultural practice. S may prove practical in heavy potato-growing sections of the state in quantities to increase pH to 5.2 or 5.—R. H. Larson.

12157. LUNGREN, E. A., and L. W. DURRELL. Black stem rust control in Colorado. Colorado Agric. Exp. Sta. Bull. 447. 1-18. 10 fig. 1938.—During the past 25 yrs. the disease has damaged small-grain crops to the extent of 335,000 bu. annually, but the losses have been materially reduced in recent years by barberry eradication and other measures, including selection for seed of rust-resistant vars.

and planting of spring wheat as early as the soil can be

and planting of spring wheat as early as the son can be properly prepared.—Courtesy Exp. Sta. Rec.
12158. RANDALL, G. O. Soil disinfection. Amer.
Nurseryman 68(5): 3, 4. 1938.—Methods of soil disinfection by heat and chemicals are discussed.

12159. SUMMERS, E. M., R. D. RANDS, and E. V. ABBOTT. Disease resistance tests. Sugar Bull. 17(1): 30-32. 1938.—A pathological summary of agronomic selections from the C. P. 1929-33 sugar cane seedling series is compared with present commercial vars. Several of the more extensively tested selections are said to promise considerable reduction in losses from the major diseases on present commercial vars., should they be found satisfactory for commercial use in other respects. Of the 9,185 seedlings examined 65 have been assigned new C. P. numbers, and many of them combine resistance to red rot and mosaic with an indicated early maturity.—Courtesy Exp. Sta. Rec.

12160. WEAN, R. E. Leaf spot of black cherry. Proc. Indiana Acad. Sci. 48: 48-49. 1 fig. 1938(1939).—Seedlings of Prunus serotina growing in nursery beds were used in exptl. plots to determine the mode of infection by the leaf-spot organism and to find a suitable spray soln, for protection of the young plants. By applying a spore suspension of Cylindrosporium, the conidial stage of Coccomuces sp., it was found that penetration through the lower leaf surface was over 4 times as great as through the upper surface. Sprays that appeared to have protective value and to be free from unfavorable effects on seedling growth were Cu phosphate and Bordeaux mixture; lime sulphur + iron sulphate caused severe stunting and killed many seedlings.-R. E. Wean.

12161. WINKELMANN, A. Die Entwicklung der Lohnbeiz-kontrolle in Westfalen und ihre Bedeutung für die landwirtschaftliche Praxis. Kranke Pflanze 15(9): 145-149. 1938.—The number of commercial seed treatment stations of small grains has greatly increased throughout the province of Westphalia, Germany. Since 1931, these stations have been under government supervision in that official tests are made of the treated seed.—R. Weindling.

MISCELLANEOUS

12162. BEATTIE, R. K., and B. S. CRANDALL. Disease attacks the persimmon. Amer. Forests 45(3): 120-121, 124. Illus. 1939.

12163. DOYER, L. C. Manual for the determination of seed-borne diseases. 59p. 33 pl. H. Veenman and Sons: Wageningen, 1938.—This work was accomplished in collaboration with members of the Committee for the Determination of Seed-Borne Diseases, and includes both diseases and pests. The general part takes up general classification, methods of investigation and general remarks, and improving the sanitary condition of the seed by cleaning or by treating. The special part presents data on infections and infestations caused by parasitic organisms and storehouse pests of specific crop plants, including cereals, grass seeds, peas, the various types of beans, clover, beets, flax, cabbage, celery, parsley, carrots, spinach, lettuce, onions, black salsify, tomatoes, corn-salad, and tree seeds. A section on saprophytic fungi and a list of seed-borne infections and infestations are included. The bibliography contains 39 references.—Courtesy Exp. Sta. Rec.

12164. EHRLICH, JOHN. Proposed additions to etiological terminology. *Phytopath*. 29(5): 459. 1939.—The terms saprogen, saprogenic, and saprogenicity are proposed, with particular reference to wood decay.—J. Ehrlich.

12165. ITZEROTT, DOROTHEA. Ein Fütterungsversuch

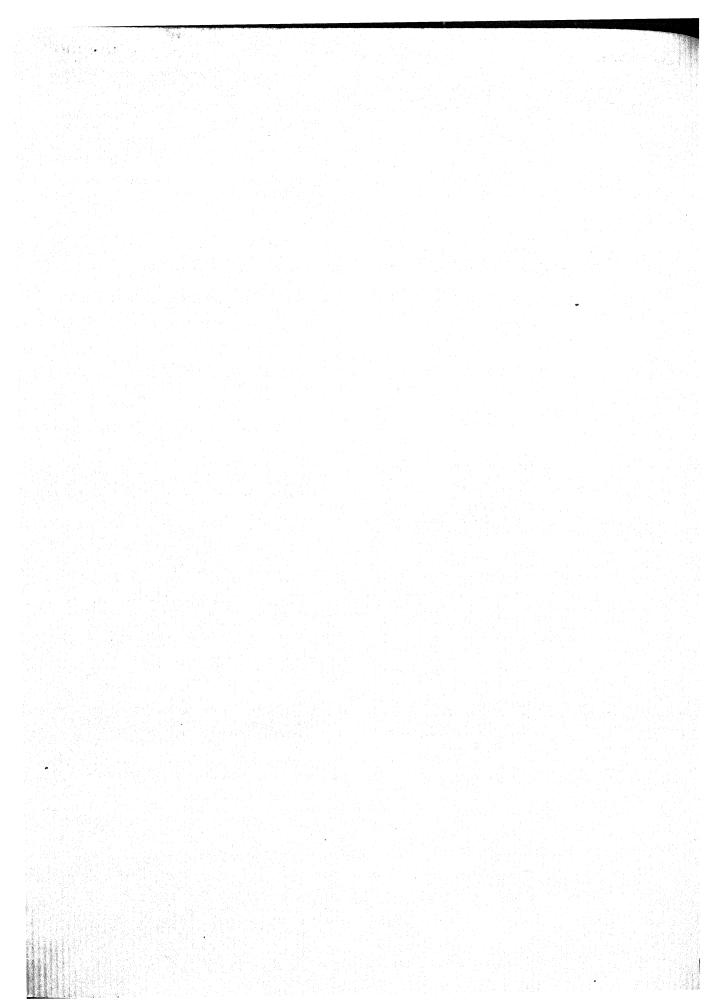
an Meerschweinchen mit Maisbrandsporen. Zeitschr. Pflanzenkr. 49(1): 40-41. 1939.—Reports of injurious effects to animals, especially cows and horses, from feeding on smutted maize straw led to expts. with guinea pigs fed small quantities of corn smut spores (Ustilago maydis) mixed with wheat bran, beets, or potatoes. Pregnant guinea pigs given a daily ration of 0.2-0.3 g. of spores for 6-8 weeks gave birth to normal living young during that time. There were no abortions and no injurious effects from the smut spores.-H. Hart

12166. MARSHALL, RUSH P. Combating infection of storm-damaged trees. Eastern Shade Tree Conference, Proceedings Dec. 8, 9, 1938. p.36-39, 1939.—Wood-rotting fungi have found ready access to the exposed wood of storm-damaged trees. The hurricane occurred at the season when deciduous trees are least able to protect themselves from infection, as callus formation does not proceed during the dormant season, nor is there any appreciable plugging of vessels by wound gums and tyloses when the tree is not in active growth condition. Detailed directions for pruning and treatment of wounds are given.—R. Silverman.

12167. MELHUS, IRVING E., and GEORGE C. KENT. Elements of plant pathology. x + 493p. 259 fig. Macmillan Co.: New York, 1939. Pr. \$4.—The principal objective of this book is the "solution of a practical teaching situation from the standpoint of subject matter." Its chief contribution, in the words of the Preface, "lies in the emphasis placed on parasitism in disease processes and the principles relating to control measures." To this should be added that it has assembled, and very competently condensed and presented, a number of examples selected from the diseases that are of general economic importance in the United States, or are of special familiarity in the Central States where the development of this book as a teaching manual took place. The concepts of the nature of and the factors in parasitism are presented in a general chapter under such familiar subheads as infection phenomena, resistance and susceptibility, immunity, specialization in parasites, polymorphism, mycorrhiza, and epiphytotic diseases. The principles are then repeatedly and graphically emphasized in the 9 chapters on diseases caused by different agents, including besides fungi, bacteria, nematodes, seed plants and non-parasitic agents, an up-to-date chapter on virus diseases and a brief one on plant-parasitic nematodes. Diagrams are liberally used in making the text graphic and concise; photographs and drawings are well selected and reproduced, and are used in exceptionally generous numbers. The chapters on environmental influences on plant disease and on plant pathology and human affairs, in which are discussed the economic aspects of plant disease, both contemporaneously and historically, present selected material in readily comprehendible terms. chapter on principles of control measures is especially thorough. The book affords a most helpful tool in teaching plant pathology.—F. Weiss.

12168. SPAULDING, PERLEY. Wood rots as factors before and after the hurricane. Eastern Shade Tree Conference, Proceedings Dec. 8, 9, 1938. p.34-36, 1939.—A general discussion of the need for and the methods of combating wood rots in the injured but still vital trees in the hurricane devastated portions of the Northeastern States. The recommendations apply especially to trees in home and park plantings, and in cities, rather than to forest

12169. WEST, J. A preliminary list of plant diseases in Nigeria. Bull. Miscell. Inform. Kew 1938(1): 17-23. 1938.



ECOLOGY

Editors

W. C. ALLEE, General Animal Ecology G. D. FULLER, General Plant Ecology CHANCEY JUDAY, Hydrobiology (Oceanography, Limnology) FREDERICK A. DAVIDSON, Ecology of Wildlife Management—Aquatic W. L. McATEE, Ecology of Wildlife Management— Terrestrial ROBERT G. STONE, Bioclimatics, Biometeorology

(See also in this issue Entries [GENERAL AND ANIMAL ECOLOGY]: Zoogeography of East Africa, 12494; Crowding as affecting reproduction of Xenopus, 13039; Soil microorganisms, 13686; Flight of grasshoppers, 14122, 14275; Woolly aphid of spruce, 14129; Anopheles larvae count, 14167; Physiography in relation to malaria, 14191; Gastrotricha of Rumania, 14221; Feeding habit of snails, 14228; Chironomidae, 14258; Commensalism goby-shrimp, 14286; Herpetology of Great Smokey Mts., 14288; Pocket gophers, 14309. [PLANT ECOLOGY]: Polyploidy as means of extending range, 12506; Dispersal of Oenothera organensis, 12523; Phytogeography of Bering Strait, 13776; Range plant constituents in California, 13809; Tuber formation in potatoes, 13817; Soil moisture detn. 13849; Subsoil water content in Great Plains, 13851; Erosion in S. Africa, 13853; Decay of plants on acid racks, 13854; Leaf shape correlated with drought resistance, 13888; Reproduction of Pinus strobus, 13925; Storm damage to forests, 13929; Reproduction in white pine, 13965; Osmotic values of range grasses, S. Africa, 13996)

GENERAL

12564. CLEMENTS, FREDERIC E., and VICTOR E. SHELFORD. Bio-ecology. viii +425p. 85 fig. John Wiley and Sons, Inc.: New York, 1939. Pr. \$4.50.—This book is an attempt to fuse and harmonize the concepts of plant and animal ecology which have largely been separated in their historical development. This has necessitated some simpli-fication in treatment and reduction in technical terminology. The new term bio-ecology is proposed because of the diversity of content in the term ecology, and also because of its synthetic connotation. In practise it is restricted to the study of biotic communities or microcosms, or the science of community populations and deals also with the cause and effect relations between habitat on the one hand and the organism and community on the other. In actual content the work is more largely concerned with the inter-relations of organisms, with parasitism and disease relegated to an insignificant relation in the pattern. The opening chapter on the nature and relations of bio-ecology presents the historical development of ecology and its terminology. The term "biome" is used for the biotic formation or super-organism. The word "factor" is restricted to the physical forces and conditions that constitute the habitat. The term "niche" is used also with this restriction. The term "ece" is commended for its utility, habitat as a desirable synonym, and environment has a proper rôle in application to the total setting of individual or organism. Climatic factors are paramount in determining climax and local factors in fixing the sere or cycle of development of the community. The cycles of cause and effect, adjustment and adaptation, life history, and life forms, in plants and animals are discussed in their relations to ecological concepts. Community functions, aggregations, migrations, and ecesis, all enter into the dynamics of biotic formations. The influence of the biotic community on the habitat takes many forms under different conditions. Under the term coaction the interrelations of organisms are discussed, including food relations, symbiosis, but not parasitism. Aggregation, competition, biotic balance, territory, cycles of population and their physical causes, other than disease, are presented with many illustrations. The factors correlated with the migrations of fishes, insects, and birds are reviewed. The types, structure, composition, dominants, subdominants, kinds of influents and major and minor units constituting climaxes of plant and animal com-munities are reviewed. As an example of the biome the North American grassland in its several forms of true prairie, coastal prairie, mixed prairie, desert plains, California prairie, Palouse prairie, and aspen parkland is analysed as to its life forms and life habits and a comparable presentation is made of aquatic communities and marine plimar. There is an extensive hilling the content of the communities and marine plimar. climax. There is an extensive bibliography.—C. A. Kofoid.

12565. SEARS, P. B. Life and environment. The inter-

12565. SEARS, P. B. Life and environment. The interrelations of living things. xxii+175p. Bureau of Publications, Teachers College, Columbia University: New York, 1939. Pr. \$1.85.—This first volume to appear in the Modern Living Series of basic science material for use in modern education is a broad survey of man's relation to his environment. Though dealing with the basic environing factors of all life, it is not a general animal ecology. The book is con-

cerned with the unity of life and environment and the relations of knowledge and analysis of the environment to advance in human culture. The main divisions of the environment are the lithosphere, hydrosphere, atmosphere, and biosphere. To this for man is added human society as an immediate living environment, a unique element in the biosphere. The community constitutes a moving equilibrium of human units and is itself related to its environment through the inherited capacities of its human units developed in and with the aid of the environment. Ecology is the analysis and testing of all known factors in the social group and their synthesis in scientific terms. It provides a scientific basis for human control of environment and sets the cultural pattern. An appendix discusses the use of the material in the book in teaching and provides a bibliography. —C. A. Kofoid.

BIOCLIMATICS, BIOMETEOROLOGY

(See also in this issue Entries 12520, 12552, 12600, 12606, 12613, 12616, 12622, 12630, 12779, 13102, 13353, 13644, 13817, 13859, 13866, 13871, 13879, 13890, 13901, 13906, 13914, 14024, 14027, 14123, 14129)

12566. ANDERSON, W. A. Studies in evaporation: I. Evaporation from an eastward facing slope. *Univ. Iowa Stud. Nat. Hist.* 17(8): 363-370. 3 fig. 1938.—This paper presents records of evaporation from 3 points on an eastward sloping hill, leading down to West Lake Okoboji, Dickinson Co., Ia. Average evaporation, day and night, from Livingston atmometers shows marked difference in losses between a station on the prairie and one on the lake bluff. The average of the prairie station is well within averages at Douglas Lake, Mich., as reported by Gates. Rates of evaporation from Piche evaporimeters, day and night read separately, show less difference among the 3 stations than their positions would indicate. While the prairie station ran consistently higher than the others, an occasional high day on any of them made them essentially alike if we accept Shimek's theory that the days of greatest stress and not averages are significant in the distribution of forest. Evaporation from the 3 stations after shrubs and trees had been removed shows close correlation among all of them. The prairie station ran at a continuous high rate all afternoon. This and not a maximum peak between 2 and 4 p.m. accounts for higher total evaporation at this point, when it does occur. Evaporimeters placed in 2 sumac colonies indicate that evaporation rates are more modified by plant cover than by position on this slope. There is no indication in the data obtained that evaporation rates on this slope are sufficiently high to inhibit invasion and growth of woodland on any part of it.-

12567. EREDIA, F. Gli strumenti di meteorologia ed aerologia. 2 edit. iv + 426p. 307 fig. G. Bardi: Roma, 1936. Pr. 75 Lire.—This work is intended to describe the principles, design, and use of the instruments which observers and students in the Italian aviation, engineering, sanitary, agricultural and meteorological services would probably need to use. The treatment is purely descriptive, there being little theoretical or mathematical discussion and photographs are largely substituted for schematic line-drawings. Italian,

is little information or reference to British or American models. There are no references to literature. Although no such thoroughness is attained as found in Kleinschmidt's "Handbuch" or Glazebrook's "Dictionary of Applied Physics," a wide range of instruments is included: solar radiation, atmospheric dust, visibility, pressure, temperature, evaporation, humidity, wind, cooling power, clouds, pre-cipitation, snow, polarization, atmospheric electricity, pilot balloons and theodolites, meteorographs, radio-sondes, and installation of observatories, etc. Special research techniques are largely omitted. The format is good and the photographs usually clear, making an attractive and impressive volume.—R. G. Stone (courtesy Bull. Amer. Meteorol. Soc.). 12568. HERZOG, FRANZ. Formgestalt und Wärmehaushalt bei Sukulten. Jahrb. wiss. Bot. 87(2/3): 211-243.
1938.—The temp. distr. in a body receiving radiation on one side (of plates or cylinder form) is considered theoretically and then tested by thermo-electric measurements on paraffin wax models and on cacti. An appendix by R. REBSCH develops the theoretical distribution of the temps. in a paraffin plate. In radiation expts. under controlled conditions the action of ribs, warty projections, thorns and hair coverings on the heating of succulents is investigated. The action of these form factors in plants is extraordinarily modified by their influence on reflection and on the reduction of gas exchanges. None of these form features appear to have significance as facilitating heat economy except, perhaps, the splitting of the surface into a few wing-like ribs. Further the burying of Mesembryanthemum in the soil has no advantage from this standpoint. Of quite outstanding significance to the degree of heating of the plant body is the air movement, which even at low velocities entirely removes the danger of overheating and which is to be regarded as the most significant ecological factor of the habitat. Expts. in the natural habitats in full summer confirm these laboratory expts. upon a series of types of succulents.—J. H. Priestley.

German and French commercial makes are shown, but there

12569. HINCHY, V. M. The relation between frond transpiration and yield of sap in the nipah palm (Nipah fruticans). Malayan Agric. Jour. 26(10): 420-425. 1938.—
The daily variation in yield of sap from tapped spathes was inverse to the relative humidity. Installation of atmometers on a level of the tops of the palms enabled the plantation management to forecast very closely the yield of sap for the day, when read at 7 A.M. A nipah plantation should not be exposed to brilliant sunshine and high winds. Shade trees and wind breaks should be provided, not so dense as to exclude light but sufficient to disseminate the rays of

the midday sun, and for this purpose interplanting of coconuts is recommended.—W. D. Pierce.

12570. HUMMEL, K. Über die Temperaturen in der Sojablitte. Bioklimatische Beiblätter 6(1): 13-17. 3 fig. 1939. The development of fruits in artificially pollinated soybean plants is exceptionally dependent upon climatic factors. Under natural conditions the temp. inside a normal, exposed flower may exceed the air temp. by as much as 6°C on bright days. Inside the dry bag covering the artificially pollinated bloom, however, the temp. level in the day-time is about 3°C above that of a flower not enclosed in a bag. A moist paper bag keeps the temp. approx. on the same level as in the natural flower.—H. Landsberg.

12571. WILSON, L. R. A temperature study of a Wisconsin peat bog. Ecology 20(3): 432-433. 1939.—Temps. taken vertically through a peat deposit decreased from the surface to near the bottom, where a slight rise was noted. It is suggested that the lowest peat is heated from the sand below, and the sand is a conductor of heat from the periphery of the deposit.—L. R. Wilson.

ANIMAL

12572. BAWEJA, K. D. Studies of the soil fauna, with special reference to the recolonization of sterilized soil. Jour. Animal Ecol. 8(1): 120-161. 1939.—Four plots (9 × 9 ft.) at Rothamsted Exptl. Station, England, were sterilized by baking to a depth of 1 ft. in Feb. and 4 more in May, 1936. Two plots in each set were enclosed on the 4 sides by iron sheets 12 in below and 6 in above ground; the others were left unenclosed. Control plots were provided for com-

parison. Lawn grass was later sown in all plots. After sterilization, fortnightly samples of the soil were taken through 14 months to study recolonization. The prominent animals that occurred were (of insects) Collembola, Diptera, Coleoptera, Hemiptera, and Hymenoptera, and (of other invertebrates) Myriopoda, Arachnida, and Oligochaeta. In the control plots the mean normal population varied from 61.2 to 67.6 million, and in the sterilized plots from 98.3 to 111.8 million per acre. An analysis is given of the individual orders and immature forms. 7 and 5 months respectively were required for the soil population to reach a normal density in the sterilized unenclosed and enclosed plots, by which time their populations were 1.5 to 1.8 times the controls. The proportion of insects to other invertebrates was raised from 2:1 in the controls to 20:1 in certain of the sterilized plots, a striking instance being that of Aphidi-dae, which increased 43.6 times the controls. The peak seasonal density of population was reached in late Autumn and was caused especially by a sudden increase and later decrease of Collembola. Decreasing temps. between 55° and 45° F seem optimum for this latter group. Economic aspects of sterilized soils in greenhouses and baked soils in tropics are discussed. A few organisms were found in soil to a depth of 33 in, but 80 to 91% occurred in the top 9 in, being higher in spring than in winter in the top layers but the reverse in the deeper subsoil.—S. C. Kendeigh.

12573. HAWES, R. S. The flood factor in the ecology of caves. Jour. Animal Ecol. 8(1): 1-5. 1939.—Summer drought and winter flood introduce a variable into an otherwise constant cave environment. This alternation imposes recurrent quiescent and active phases on such cave inhabitants as serpulid polychaete worms, plumatellids, and sponges. Flooding introduces food into the caves while regression of flood waters may isolate small groups of organisms into small pools for months at a time. Dispersal of animals from one cave to another may be brought about by flooding, and an illustration is given with a small cyprinid fish, how flooding may aid in the colonization of caves with fauna from the outside.—S. C. Kendeigh.

12574. KUGLER, HANS. Blütenökologische Untersuchungen mit Hummeln. IX. Planta 29(1): 47-66. 1938.—In previous expts. it was found that diversity of shape and color and depth of the object enhance the attractiveness of models for bumble bees. In the present study it is shown that these characters if they pertain to true flowers have the same effect. Thus Cichorium intybus is more attractive than Geranium pratense. Flowers with 2 or more distinct colors are more attractive than those with only one. Funnel shaped flowers as those of Gentiana or headed flowers such as Aconitum have especially attractive shapes. The flower heads of Trifolium knautia and Cirsium are relatively unattractive. This is, however, only true of the close-up optical effect of the latter flowers, and this is amply overbalanced by their high nectar content. Thus diversity of shape and color have appreciable selective value where bumble bees act as pollinators and where these are not overly abundant.— B. R. Nebel.

12575. LESLIE, P. H., and D. H. S. DAVIS. An attempt to determine the absolute number of rats on a given area. Jour. Animal Ecol. 8(1): 94-113. 1939.—An area of town is trapped over a series of nights in a systematic manner for Rattus rattus and the results subjected to a theoretical statistical analysis in an attempt to calculate the probable total population. A theory of trapping is suggested which is an adaptation of the elementary kinetic theory of gases.

S. C. Kendeigh.

12576. McDONOGH, RICHARD S. The habitat, distribution and dispersal of the psychid moth, Luffia ferchaultella, in England and Wales. Jour. Animal Ecol. 8(1): 10-28. 1939.—This small wingless moth lives on tree trunks and depends for food and a protective case upon lichens, chiefly Lecanora. The moth is more abundant on trees with creviced bark, of a circumference greater than 6-8 in., growing in semi-open situations, and with algal-lichen flora. The moth larvae avoid areas on the tree with a light intensity less than 0.025 of that in the open. The distribution in England was mapped. The moth was not found on hills above 400 ft. nor in areas where the July temp. (the month when the adults emerge and lay eggs) averaged below 62° F,

although this was partly compensated for in regions with over 210 hrs. sunshine in July. Dispersal of the moth from tree to tree is largely by wind, and mass migration of the larvae may occur from one part of the tree to another. The larvae become inactive below 40° F, avoid low humidities, are positively phototropic, are more positive to red light, and in the laboratory, but perhaps not in nature, are negatively geotropic.—S. C. Kendeigh.

12577. MOORE, HILARY B. The colonization of a new rocky shore at Plymouth. Jour. Animal Ecol. 8(1): 29-38. 1939.—A newly formed beach of limestone and concrete was watched for 2 years for progress of colonization, which was chiefly by Annelida, Crustacea, and Mollusca. An established mature beach nearby was studied for comparison. In the new beach it was evident that competition for foothold was not keen but rather that colonization was a very gradual process with only some half-dozen spp. capable of finding conditions suitable from the first and that other spp. must wait for improvement in the habitat. There was some evidence that the unfavorable conditions affected the survival of the young more strongly than the adults, for once established, growth rate was normal.—S. C. Kendeigh.

12578. SMITH, E. P. On the introduction and distribution of Rana esculenta in East Kent. Jour. Animal Ecol. 8(1): 168-170. 1939.—An account is given of an introduction of 12 specimens in the winter of 1934-1935, their spread over an area 28 miles in diam., their loud and annoying songs, and 3 years later, the abatement of their vociferous singing, implying a decrease in abundance. They are very migratory, are powerful swimmers and jumpers, mature in 12 months but require 4 or 5 years to reach full size, are shy but curious in disposition, have ventriloquistic power with their voices, and mate in May and June.—S. C. Kendeigh.

12579. STAMMER, H. J. Ziele und Aufgaben tiergeographisch-ökologischer Untersuchungen in Deutschland. Zool. Anz. Suppl. (Verhandl. deutsch. zool. Ges. 11: 91-119. 1938.— A lecture urging as topics for more intensive study: taxonomy of the German fauna, food habits, characteristics of land biotopes, make-up of biocoenoses, application of the methods of hydrobiology to land habitats and communities, determination of climatic factors, relations of herbivorous animals to plants, predators to prey, population studies, and other biocoenotic equilibria.—L. H. Hyman.

other biocoenotic equilibria.—L. H. Hyman.

12580. TISCHLER, W. Zur Ökologie der wichtigsten in Deutschland an Getreide schädlichen Pentatomiden. II. Zeitschr. Morph. u. Ökol. Tiere 35(2): 251-287. 19 fig. 1939.—The chief grain-feeding pentatomids of E. Prussia are: Eurygaster testudinaria, Aelia acuminata, Palomena prasina, Dolycoris baccarum, Carpocoris pudicus, Pentatoma rufipes, and Eurydema oleraceum. Other spp. of these genera also occur. The area studied belongs chiefly to the Baltic region, with much snow (60 days), late spring, and short vegetation period (150 days). The stink bugs hibernate along forest margins and in open woods, in company with a large assemblage of other insects, of which a list is given. The summer biotope of the bugs is the dry, non-cultivable steppe-heath formation with many spp. of flowering plants; secondarily the bugs invade cultivated areas, when these are adjacent to their natural biotope. Rye is most subject to attack but when the rye is ripe the bugs may move to oat fields, and after the harvest they return to the waste lands. The bugs emerge from hibernation at the end of April, depending on ground temp., mate at once, and lay eggs at the end of May. In *Dolycoris* and *Carpocoris* there is a marked predominance of 65. The larvae hatch in June. Dependence of rate of embryonic and larval stages on temp. is shown in a series of graphs but the later instars of Palomena are eurythermal. Humidity has little effect on development but is decisive in hibernation, as mortality is greater the lower the humidity of the winter quarters. Temp. and humidity control the mortality of these bugs; the optimum conditions for the larvae are temps. of 24-30° and 80-100% relative humidity. High temps can be endured only when the humidity is high. Developing eggs are less sensitive than the larval stages. Carnivorous insects hibernating with the bugs eat considerable numbers of them, both in the winter quarters and along forest margins after emergence. The bugs are parasitized by tachinid flies, especially Gymnosoma rotundatum, and by the hymenopteron Telenomus semistriatus. Lists are given of the food plants and breeding plants of Dolycoris and Carpocoris.—L. H. Hyman.

12581. TRAHMS, OTTO-KARL. Die Grössen- und Kalkreduktion bei Mytilus edulis L. in Rügenschen Binnengewässern. Zeitschr. Morph. u. Ökol. Tiere 35(2): 246-250. 1 fig. 1939.—In the group of brackish bays of the Rügen region (Pomerania), the size of bivalves varies directly with the salt content of the water. Mytilus is very scarce and very small (10-16 mm. long) in the Grossen Jasmunder Bodden with 6.5% salt content. However, this mussel is considerably larger in other localities of the same content, so that its great reduction here seems to depend on poor nutrition. The lime content of the reduced shell is 57%, organic content 43% as compared to 82% lime, 18% organic content in Mytilus from outside waters.—L. H. Hyman.

PLANT

kraftmessungen an Halophyten-Standorten der Nordsee-küste. Biol. Zentralbl. 59(5/6): 235-273. 15 fig. 1939.—The soil at the marshy margins of the North Sea coast at Spiekeroog is separated into 2 zones by the mean high water line, below which the suction force is that of the seawater, 0.4-0.5 M NaCl, while above the line the value decreases to < 0.1 M. In general the soil with the higher water content has also the higher suction force. An outline map and profile figures of the soil showing the suction force at the surface, at 3-5 cm and at 15 cm depth show the variations at a glance. Very high values (> 5.3 M => 300 atm.) at the surface of the terrace were found. Here the greatest difference between morning and evening values amounted to 25 atm. At 3-5 cm. the daily fluctuations were slight. A comparison of the sandy soil at Spiekeroog with a muddy soil at Neuharling Island showed that 2 soils of different structure and water content may have very similar suction force because of the same concn. of Atropis was studied in relation to the suction force at Borkum. Salicornia did not thrive well where the value was 1.3 M, but could nevertheless still maintain itself where the suction force was 1.8 M. The salt conc. is the decisive factor in determining the suction force of the coast soils. At some places the plant suction force had always a higher value than the suction force of the soil, but, on a hot summer afternoon, the suction force of the soil could be greater than the suction in the plant roots.—A. H. Hersh.

12583. CANFIELD, R. H. The effect of intensity and frequency of clipping on density and yield of black grama and tobosa grass. U. S. Dept. Agric. Tech. Bull. 681. 1-32. 8 fig. 1939.—On the Jornada Exptl. Range in southern New Mexico, black grama (Boutelova eriopoda) was clipped at heights of 1 and 2 inches at intervals of 2, 4, and 6 weeks during the summer growing season and at the end of the season with one-meter-square quadrat for each treatment. During 10 yrs. for the 1-inch series and 11 years for the 2-inch series all treatments were so severe as to bring about the following conditions: (1) vegetative reproduction was prevented after the 2d year; (2) annual volume of forage was drastically curtailed; (3) density of plant cover was reduced practically to zero in the latter years of the expt. Tobosa grass (Hilaria mutica), under a similar design, was clipped for 11 yrs. at heights of 2 and 4 inches above the ground, at 1-, 2-, and 4-week intervals throughout the growing period, and at the end of the season. Clipping at 2 inches resulted in decreased density on the quadrats clipped at 1-week and 2-week intervals. Monthly clipping and the end of the growing season clippings permitted an increase in density but the physical condition of the plants was impaired and the forage yield reduced. Clipping at 4 inches produced no observable ill effects. Density increased under the clipping treatment as follows: 1 week—197%, 2 weeks—123%, 4 weeks—51%. The plot clipped weekly was outstanding in production with 9.62 g. mean annual air dry yield; while the 2- and 4-week clippings produced 5.38 g. and 6.22 g. respectively.—R. H. Canfield.

annual air dry yield; while the 2- and 4-week clippings produced 5.38 g. and 6.22 g. respectively.—R. H. Canfield.

12584. EVENARI, MICHAEL (WALTER SCHWARZ). The physiological anatomy of the transpiratory organs and the conducting systems of certain plants typical of the

wilderness of Judaea. Jour. Linn. Soc. [London] Bot. 51(340): 389-407. 16 fig. 1938.—The plants investigated can be arranged in the following groups according to their anatomical structure: (1) Extreme xeromorphic: Retama retam. (2) Herbaceous with a few xeromorphic characteristics: Heliotropium rotundifolium, Haplophyllum tuberculatum. (3) Non-herbaceous xeromorphic with succulent characteristics: Anabasis articulata, Salsola rigida. (4) Herbaceous with a few succulent and xeromorphic characteristics: Atriplex halimus. (5) Herbaceous without xeromorphic characteristics: Erodium glaucophyllum, Reseda muricata. (6) Full succulents: Suaeda asphaltica. (7) Succulents with xeric characteristics: Zygophyllum dumosum. Comparing the number of stomata of these desert plants with those of plants from other habitats, the nonsucculent desert xerophytes show the highest stomatal numbers, the desert succulents the lowest values. The transpiration per unit number of stomata is greater in the xeromorphic xerophytes with their so-called "protective" adaptations than in the xerophytes which lack such features. But these structures are not without effect. Such plants possess the property of being able to cut down their transpiration very suddenly. The full succulents show low transpiration values, but lack the power of adapting them-selves to a poor water supply from the soil. The ratios surface of water-conducting elements/fresh weight of organ and surface of water-conducting elements/surface of organ are roughly proportional to the intensity of transpiration. The other dimensions of the water-conducting system show no relationship to the transpiration intensity.—M. Evenari.

12585. FIRBAS, F. Vegetationsentwirklung und Klima-wandel in der mitteleuropäischen Spät- und Nacheiszeit. Naturwissensch. 27(6): 81-89. Illus. (incl. maps), 1939.

12586. FRASER, LILIAN, and JOYCE W. VICKERY. The ecology of the Upper Williams River and Barrington Tops Districts. III. The Eucalypt forests and general discussion. *Proc. Linn. Soc. N. S. Wales* 64(1/2): 1-33. 3 pl. 1939.—The Eucalypt-forest formation occurs on upper slopes and ridges in the Williams River valley, and on the Barrington Tops plateau. It consists of a tree stratum, composed of various species of Eucalyptus, which forms a more or less continuous but relatively thin canopy, a discontinuous small-tree stratum, a tall-shrub stratum 6-8 feet high, a low-shrub stratum and a ground stratum. A considerable amount of light reaches the lower strata in this formation. The height of the trees varies from more than 150 feet in sheltered places, such as on the valley floor, to less than 40 ft. on exposed parts of the plateau. Five associations, more or less limited by altitude, are recognized within this formation, each characterized by different species of Eucalyptus. The floras of the swamps and creeks at the head of the Barrington River are described, and the distribution of the sub-alpine and montane spp. discussed. Lists of spp. occurring in the various associations are given, and the life-form spectra of the Eucalypt forests, and of the sub-tropical and sub-antarctic rain-forests are considered. The floristic and ecological relationships of the various formations occurring within the area studied are discussed.—Authors.

12587. GRANT, CHARLOTTE L. Plant structure as influenced by soil moisture. Proc. Indiana Acad. Sci. 48: 67-70. 1938(1939).—Zinnia, Phaseolus, Impatiens, and Ricinus were grown in 3 limited and non-overlapping ranges of soil moisture—wet, moist, and dry. This method of moisture control recognizes need for adequate pre-study of moisture properties of soils used. Moisture capacity of a soil column, of the height used in cultures, field capacity, and wilting percentage are the essential properties for establishing the moisture ranges. Intervals between ranges are equal. Growth responses and anatomical data show that there are different moisture optima for growth of particular plants. Moreover, since wet, moist, and dry ranges in soils of different texture were made equivalent, a real study of soil-texture influence was made possible.—C. Grant.

12588. HALL, THOMAS F., and WILLIAM T. PEN-FOUND. A phytosociological study of a cypress-gum swamp in southeastern Louisiana. Amer. Midland Nat. 21(2): 378-395. 5 fig. 1939.—A young cypress-gum swamp near Slidell. Louisiana included the swamp black gum, Nyssa biflora, as the important species with bald cypress, Taxodivm distichum, and tupelo gum, Nyssa aquatica, as minor codominants. Although the trees were young and of small diam. (5.4-6.7 inches) the forest exhibited a basal area of 203 sq. feet per acre. Peculiarities of this swamp are the development of black gum stools, the absence of definite frutescent and herbaceous strata and the presence of relict patches of marsh. Only 8 of the 22 spp. of trees, shrubs, and vines are recognized as true swamp spp. and only 5 herbs were found within the confines of the swamp. Although the mermaid weed, Proserpinaca palustris, was the sp. of highest frequency (81%), it exhibited a low covergrade (6-25%). The small number of herbaceous spp. is due mainly to the low light intensity and long hydroperiod that obtains in this swamp .- W. T. Penfound.

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12589. HANSEN, HENRY P. Postglacial vegetation of the Driftless Area of Wisconsin. Amer. Midland Nat. 21 (3): 752-762. 5 fig. 1939.—Pollen analysis of 3 postglacial Third-Wisconsin bogs within the Driftless Area of Wisconsin, shows the postglacial forest succession which has occurred in this area. Interpretation of the pollen record indicates the forest succession was apparently as follows: An initial stage of Abies-Picea-Pinus, succeeded by a Pinus-Deciduous stage, with a final stage of Deciduous-Pinus with the advent of some prairie in recent times. In terms of climate this indicates an initial cool period, followed by a warmer period which has probably remained more or less uniform to the present. In the upper third of the spectrum the presence of grass may reflect a period of slight desiccation.—H. P. Hansen.

12590. HANSON, HERBERT C. Fire in land use and management. Amer. Midland Nat. 21(2): 415-434. 1939.— Fire has been used as a tool in the following land management practises: (1) Destruction of debris, as straw and other crop residues, logging slash, etc., to reduce fire hazard and to facilitate cropping or plant succession; (2) destruction of pests such as weeds, insects and diseases; (3) clearing land for cultivation or to improve conditions for desired plants by burning trees and shrubs, weeds as Russian thistles, draining and burning bogs, and as a substitute for tillage in crop rotation; (4) improving grazing conditions by destroying brush and trees, coarse grasses, dead vegetation, and to stimulate early spring growth; and (5) improving recreational areas. In many of these practises fire has proven distinctly serviceable, in some cases it has caused irreparable damage, and in other cases it is doubtful whether the advantages were greater than the disadvantages or not. It is the duty of research to determine fully and accurately the values and losses caused by fire not only to present existing vegetation, animal life, soils, etc., but also to the future conditions of the burned area. New uses or new disposal methods of residues and debris may be found. This duty can only be accomplished by painstaking measurements and observations involving various fields of science and lasting over a period of many years. At present the supply of scientific data of this sort is very meager. As such data accumulate, fire as a tool in land use and management will be utilized far more efficiently by administrators than

is possible at present.—H. C. Hanson.
12591. IVES, RONALD L. Infra-red photography as an aid in ecological surveys. Ecology 20(3): 433-439, 3 fig. 1939.—Differences in the infra-red reflecting power of different plant types, as determined from infra-red photographs, may be used to expedite ecological field work. Standard photographic equipment, carefully used, is adequate in most instances. The useful range of the camera using infra-red sensitive materials is seldom over 10 miles in ecological work, the accuracy of determinations declining rapidly with distance because of contrast degradation caused by scattered light in the atmosphere, and by other factors. Differences in stages of growth or states of nutrition of the plants in a single group may sometimes be determined from infra-red photographs. In any environment, careful checking of field data and photographic evidence is desirable. Serious errors of classification will occur when differences of environment, such as altitude, are not taken into consideration.—R. L.

12592. McCOY, SCOTT. A photosociological study of the woody plants constituting twenty-five type forests on the Illinoian till plain in Indiana. Proc. Indiana Acad. Sci. 48: 50-66. 4 fig. 1938(1939).—Twenty-five type forests were selected on the glacial till plain, 16 on the eastern lobe and 9 on the western lobe. Habitat sites were very similar in respect to soil texture, temp., and precipitation but differed in drainage. Ten-meter quadrats, 20 in each forest, were laid out; all the woody stems above 3 feet high were counted, and their D.B.H. measured. The size class, frequency, and density of each sp. were tabulated. Dominant spp. in the water-logged sites were Quercus palustris, Liquidambar styracifua, Acer rubrum, Nyssa sylvatica, Ulmus racemosa and Fagus grandifolia invaded the higher hummocks in wet sites and continued dominant into mesophytic beech-maple sites. Dominants on the mesophytic sites were A. saccharum, Liriodendron tulipifera, Carya glabra, Q. borealis and Fagus grandifolia. With continued dissection of site, mixed hardwoods gave way to oak-hickory. Forests on the western lobe, differing markedly from those on the eastern lobe, were predominatingly of the oak-hickory type. Less soil water, due to possible greater evaporation stresses and better subsoil drainage, may account for low frequency and fidelity of Fagus, Liquidambar and Acer saccharum in the forests on the western lobe with resultant oak-hickory control.—S. McCoy.

12593. MULLER, CORNELIUS H. Relations of the vegetation and climatic types in Nuevo Leon, Mexico. Amer. Midland Nat. 21(3): 687-729. 7 pl. 1939.—Classifications of climatic types in Nuevo Leon are exceedingly inaccurate because of the scarcity of observatories in the mountains. Existing vegetation types at high elevations indicate several cooler and more moist climatic types than those credited to the lowland observatories. Vegetation types and corresponding climatic types are described under the following designations: 1) central plateau desert scrub with warm and arid climate, 2) eastern coastal plain scrub with warm and semi-arid climate, 3) piedmont scrub and montane low forest with mild and semi-arid climate, 4) montane mesic forest with cool and subhumid climate, 5) western montane chaparral with cool and semi-arid climate, 6) subalpine humid forest with cold and humid climate, and 7) alpine meadow and timberline with alpine climate. Mean annual temps. range from 25° C on the plains to 3° C in the alpine zone; rainfall from 360 mm. to about 2,250 mm. The vegetation types range from the most scant of desert scrub to luxuriant forests and lush meadows. The altitudes range from about 300 m. to 3,800 m., the mountains occupying over one-fourth the area of the State. Landscape photographs illustrate the vegetation types; maps include relief and distribution of vegetation and climatic types.—C. H. Muller.

12594. OOSTING, HENRY J., and LEWIS E. ANDERSON. Plant succession on granite rock in eastern North Carolina. Bot. Gaz. 100(4): 750-768. 9 fig. 1939.—Granitic rock outcrops are frequent in the vicinity of the fall-line in N. Carolina, S. Carolina and Georgia. The unfavorable conditions for plant development on rock are here accentuated by long dry summers and high temps. Succession on the N. Carolina rocks follows 2 major lines originating (1) on the rock surface and (2) in depressions. Grimmia is the important mat-forming pioneer followed by (1) Cladonia-Selaginella, (2) Polytrichum, (3) Andropogon, and (4) Conifers. The depressions have a variable development terminating in hardwoods. Considering the rate of succession it is suggested that vegetation once completely covered the rocks but that the activities of man resulting in frequent fires and erosion bared the surfaces which are today maintained by drought, windthrow and fire.—Authors.

12595. PENFOUND, W. T., and T. F. HALL. A phytosociological analysis of a tupelo gum forest near Huntsville, Alabama. Ecology 20(3): 358-364. 3 fig. 1939.—A tupelo gum swamp near Huntsville, Alabama, is characterized by a dense arborescent stratum, but no frutescent or herbaceous layers. The slender trees are nearly 200 yrs. old, 104 feet in height, 9 inches in diameter at the height of one's head but with swollen bases 16.5 inches through. The north faces of the trees are clothed with a mantle of liverworts and mosses but the south exposures are devoid of bryophytes. Only 12 arborescent spp. and 7 herbaceous spp.

were found in this swamp presumably due to the combination of dense shade and long hydroperiod.—W. T. Penfound.

12596. SCHAEDE, REINHOLD. Die Actinomycetensymbiose von Myrica gale. Planta 29(1): 32-46. 1938.—The walls of the older cells carrying infection become lignified, as do the membranes of the fungus where it penetrates the cell walls. The plasma of the fungus becomes digested which may not affect the membranes. In certain nodules the digestion is not complete. One can distinguish 2 groups of nodules: in one the host has the complete supremacy at the expense of the endophyte; in the other the endophyte may establish bacterioid bodies which remain enclosed in the lignified cells of the host as long as the nodules live.—B. R. Nebel.

12597. SERMOLLI, RODOLFO PICHI. Aspetti del paesaggio vegetale nell' alto Semièn (Africa Orientale Italiana). [Glimpses of vegetation in the highlands of Italian East Africa.] Nuovo Gior. Bot. Ital. 45(1): CXV-CXXIV. 4 pl., 3 fig. 1938(1939).—The vegetation of these highlands of northern Ethiopia may be described in 4 horizons. (a) The lower grassland, alt. 9,200-9,900 ft., is a meadow or prairie area with low herbs besprinkled with shrubs such as Hypericum lanceolatum and, in the higher parts, Erica arborea and Rosa abyssinica. (b) Ericetum, alt. up to 11,000 ft., a scrub growth of E. arborea and H. lanceolatum, both 2-4 ft. tall, and with intercalated low herbs. (c) Higher grassland, up to 13,000 ft., composed of grasses, sedges, flowering herbs, and such undershrubs as Helichrysum, Thymus, and Blaeria, with scattered individuals of the tall, narrow Lobelia rhynchopetalum trees which give this zone the appearance of a cultivated park or garden. (d) Rock steppe, above 13,000 ft., made up of undershrubs, species of Helichrysum and Senecio, and of herbs belonging to the Ranunculaceae, Saxifragaceae, Brassicaceae, and Carduaceae, which grow in fissures and between rock masses.—F. Ramaley.

rock masses.—F. Ramaley.
12598. TALBOT, M. W., H. H. BISWELL, and A. L. HORMAY. Fluctuations in the annual vegetation of California. Ecology 20(3): 394-402. 2 fig. 1939.—Abrupt and pronounced changes from year to year, in both quantity and composition, characterize the "annual-type" herbaceous vegetation on some 25 million acres of grazing lands in California. These extensive areas contrast sharply with other major forage regions of the West, in 2 respects: (1) the preponderance of annual plants instead of perennials and (2) the surprising abundance of plants from the Old World. E.g., an extensive survey of the San Jacquin Valley foothills, yielding data from 2,165 plots widely distributed through 11 counties, revealed an average of only about 3% of perennials. According to the same survey, introduced plants in the whole foothill area, all types combined, averaged 58% of the total herbaceous vegetation. Under the variable influence of such factors as arid climate and erratic weather, of livestock grazing and other treatment, this unique herbaceous carpet of annual plants undergoes changes that are both rapid and uncertain in comparison with the more stable perennial plant associations. From year to year species rise and fall in relative abundance, and wide extremes in yield occur. The authors discuss the fluctuations in these "annual types" in the light of quantitative data from the San Joaquin Experimental Range, a cooperative research area for investigation of problems of foothill range management. The paper deals specifically with vegetation changes in exptl. pastures, in fenced exclosures and on the open range—fluctuations that directly concern and complicate range and watershed management.-M. W. Talbot.

12599. THOMPSON, ISABEL. Geographical affinities of the flora of Ohio. Amer. Midland Nat. 21(3): 730-751. 106 fig. 1939.—The species that are either disjuncts or near the margin of their flora of the state, exclusive of the Gramineae and Cyperaceae, on the basis of their general ranges, may be divided into 5 floristic elements, the northern, the Appalachian, the southern, the coastal plain, and the western. Their presence and distribution within the state can be explained by considering past conditions and migrations as well as present edaphic and climatic conditions. The northern species represent a retreating group that entered the state during Wisconsin and post-

Wisconsin migrations. The Appalachian and southern elements include both stationary and advancing species and are the oldest in the state, having survived glaciation in the unglaciated region. Most of the coastal plain species entered the state rather recently, when conditions were favorable for extensions along the glacial Great Lakes. Those in the Allegheny Plateau are probably relics of the Tertiary flora. The Mississippi embayment species are at the northern limits of their range in Ohio. The western species are relics of xerothermic periods of the past.—I.

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12504. WHITMAN, WARREN, and HERBERT C. HAN-SON. Vegetation on scoria and clay buttes in western North Dakota. *Ecology* 20(3): 455-457. 1939.—The different types of materials predominating in the clay buttes and in the "scoria" buttes of the badlands area of western N. Dakota afford somewhat different conditions for the development of vegetation. The typical vegetation of the scoria butte may be called the Mentselia decapetala and Juniperus horizontalis type. With these species, shrubs such as Rhus trilobata, Symphoricarpos occidentalis, Chrysobotrya odorata, Dasiphora fruticosa, Shepherdia argentea, Prunus melanocarpa, and P. pumila frequently occur. The principal associated grasses are Agropyron spicatum, Muhlenbergia cuspidata. Carex filifolia, C. eleocharis, and C. pennsylvanica are often present in lesser abundance. The vegetation that is found on the steep slopes of the clay buttes is a community of Artemisia tridentata, Chrysothamnus graveolens, and Sarcobatus vermiculatus. Errogonum multiceps is frequently associated with this vegetation type, as well as Artemisia longifolia, Atriplex confertifolia, A. nuttallii, A. hastata and others. The grasses that are most commonly associated with this clay-butte type of vegeta-tion are Agropyron spicatum and Distichlis stricta. As the forces of wind and water erode and round off the tops of the buttes and the slopes of the sides become more gradual. the grasses increase in prominence and the shrubby species tend to decrease. However, a rounded clay or scoria hill can no longer qualify as a butte, and any successional changes occurring on such formations are distinctly different from changes occurring on scoria or clay buttes.-W. Whitman.

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possible explanations are discussed.—Auth. summ.

12607. GILLAM, A. E., M. S. EL RIDI, and R. S.
WIMPENNY. The seasonal variation in biological composition of certain plankton samples from the North Sea in relation to their content of vitamin A, carotenoids, chlorophyll, and total fatty matter. Jour. Exp. Biol. 16 (1): 71-88. 1939.—A combined chemical and biological study of the plankton of the southern North Sea was made. 3 vertical hauls, with a Hensen net (silk cone, 60 meshes to the inch) were taken at 6 positions between Flamborough Head and the South-West Patch of the Dogger Bank, monthly from Jan. to Nov., 1936. One haul was used for biological examination, the 2d for detns. of % of ether-soluble matter and the 3d to determine carotenoids, chlorophyll, vit. A and total solids. The biol. results showed that the total plankton depended on 3 diatom outbursts, the largest in May, another little inferior in numbers in Aug., and a small one in Oct. Peridinians and the zooplankton occurred successively in relatively greater numbers with each outburst, but reached their maximum in Aug. when the mass of the plankton was at its greatest. Carotene, chlorophyll and vitamin A were detected in the gross plankton extracts; positive tests for fucoxanthin were obtained only on a few isolated occasions. An examination of a large phytoplankton sample (obtained by tow net) containing Rhizosolenia styliformis and Biddulphia sinensis only, showed that no vit. A as such was present. Carotene and xanthophyll, however, were present, in the ratio of 1:1.82, which is comparable with the ratio typical of land plants. Total carotenoids equalled 0.1% calculated on dry weight. Of the chemical constituents, the seasonal variation of chlorophyll most nearly coincided with the total mass of the plankton. The carotenoids reached their peak slightly before the maximal biological development; the vit. A content reached its maximum in the month after the spring diatom outburst and much preceded the maximum for the plankton crop as sampled by the Hensen net.—Auth. summ.

12608. THIEL, M. E. Naturgeschichte des Seemooses.

Handbuch Seefisch. Nordeuropas 3(3): 1-34. 25 fig. 1938.—

The term sea-moss, as used by the author, includes all technically related hydroid colonies; but the discussion is primarily concerned with Sertularia, as Abietinaria and Thujaria are taken only incidentally in the fishery. Systematically, the species of true sea-moss belong to one of the 3 sub-families of Sertularidae. The structural characteristics, life history, and geographical distribution of the group are adequately and non-technically described. Commercially, Sertularia cupressina and S. argentea are the important species. They are taken on certain "sea-moss banks" with specially designed tow rakes.—S. R. Hatton.

LIMNOLOGY

(See also in this issue Entries 13723, 14220)

12609. EGGLETON, FRANK E. Fresh-water communities. Amer. Midland Nat. 21(1): 56-74. 1939.—Two fundamentally different concepts of the interrelationships of organisms and their environment have influenced ecologists. One view stresses the habitat, the other the organisms. The central theme of Limnology is biological productivity. Diversity of fauna and habitats is a marked characteristic of fresh waters. This has resulted in many systems of classification for these habitats and their biotic communities. Lotic communities vary greatly in different types of streams. In intermittent streams the biota is restricted by the peculiar exigencies of the habitat. Species are few and populations manifest marked fluctuations. One of the most powerful factors in lotic communities is current. Lentic communities are of 2 general types—limnetic and benthic. The open waters support groups of organisms which fall into 3 major kinds: neuston, plankton, and nekton. The substratum under the waters from shore-line to deepest

water exhibits 3 well-defined regions-littoral, sublittoral, and profundal. Each of the situations offers a wide variety of habitats and the biotic communities vary accordingly. Present trends of fresh-water investigation are following two well-marked aspects of emphasis. One of these is concerned with applied limnology, the other with basic research. Much more fundamental is the cleavage on the point of emphasis into 3 major phases—the environmental, the biotic, and the truly limnological. A combination of the first 2 is urged as the desirable approach and the most recent development within the field, viz., exptl. work both in the lake and in the laboratory is regarded as especially promising and important. It is high time the subject ceased to be purely observational and began to seek causes.-F. E. Eggleton.

12610. GESSNER, F. Die Phosphorarmut der Gewässer und ihre Beziehung zum Kalkgehalt. Internat. Rev. ges. Hydrobiol. u. Hydrogr. 38(3/4): 202-211. 1 fig. 1939.—Since Ca₃ (PO₄)₂ is less soluble than CaCO₃, addition of the latter substance to natural waters should cause a removal of P from soln. This is confirmed experimentally; an approx. linear relation between addition of CaCO3 and fall in P-content is found. Expts. also show that the removal of bicarbonate from soln. by plants, which under certain circumstances (high Ca) leads to the deposition of CaCO₃, also causes a reduction in P. It is suggested that this phenomenon characterizes the "alkalitrophic lakes" of Naumann's classification, and is in part responsible for the general, nearly world-wide deficiency of P in natural waters. E. S. Deevey.

12611. MEUCHE, ALFRED. Die Fauna im Algenbewuchs. Nach Untersuchungen in Litoral ostholsteinischen Seen. Arch. Hydrobiol. 34(3): 349-520. 9 fig. 1939.—The fauna of the lasion, or attached mats of material formed of living or dead organisms, was studied in 28 freshwater lakes rich in Ca (over 26 mg/l), in 3 intermediate lakes, in 9 Ca poor lakes (under 10 mg/l) and in 2 brackish lakes. 514 different forms were definitely identified to spp. in 130 samples; 43 spp. came from brackish water, of which 7 were stenohaline forms. Fresh algal growths in May yielded only 22 spp., while similar habitats in Nov. contained 36 spp. and immersed growths as many as 52 spp. The density of the animal population depended upon the amt. of suitable food in the mat. Very few forms were found in suitable rood in the mat. Very lew forms were found in the parts of the mat that projected above the water. Many pool forms were present in the mats. The various forms were divided into 3 ecological groups: lasiobiont, lasiophil and lasioxen. 21 spp. had not previously been reported from Germany. 6 new spp. (described elsewhere) were found in the material.—G. E. Hutchinson.

12612. MOZLEY, A. The Quill Lakes basin, Saskatchewan, Canada, and its molluscan fauna. Internat. Rev. ges. Hydrobiol. u. Hydrogr. 38(3/4): 243-249. 1939.—The basin studied includes Big Quill Lake $(29 \times 17 \text{ km})$. Little Quill Lake $(24 \times 10 \text{ km})$ and several small, normally undrained bodies of water of either permanent or temporary charbodies of water of either permanent or temporary character. A progressive increase in dissolved material is noted as the hydrographic gradient is followed from the periphery to the center (Big Quill Lake). Foam Lake, a small, fresh (total solids 664 p.p.m.) body of water near the periphery, shelters a molluscan fauna consisting of Lymnea stagnalis jugularis, L. palustris, L. caperata, Planorbis trivolvis, P. exacuous, P. arcticus, Physa gyrina, all of which, together with Musculium securis and Pisidium spp. are found in permanent streams within the basin. L. palustris and L. caperata are also found in temporary L. palustris and L. caperata are also found in temporary streams. Lymnea palustris and Physa gyrina were found living in Little Quill Lake (total solids ca. 9,500 p.p.m.); shells of 6 other spp. were found on the shore. One of these, Planorbula campestris, is confined to a tatic ponds, and it is suggested that all the shells were introduced by streams and deposited by waves. No mollusca were found living in Big Quill Lake (total solids ca. 16,000 p.p.m.) and shells of *L. palustris* only were found on the shore. The usual sequence of aquatic habitats within the basin is believed to be: temporary ponds-intermittent streamsfresh-water lakes-permanent streams-saline lakes.-E. S.

12613. PICHLER, W. Unsere Kenntnis von der Thermik

Wisconsin migrations. The Appalachian and southern elements include both stationary and advancing species and are the oldest in the state, having survived glaciation in the unglaciated region. Most of the coastal plain species entered the state rather recently, when conditions were favorable for extensions along the glacial Great Lakes. Those in the Allegheny Plateau are probably relics of the Tertiary flora. The Mississippi embayment species are at the northern limits of their range in Ohio. The western species are relics of xerothermic periods of the past.—I. Thompson.

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12606. CLARKE, GEORGE L., and DAVID D. BONNET. The influence of temperature on the survival, growth and respiration of Calanus finmarchicus. Biol. Bull. 76(3): 371-383. 1939.—Laboratory tests on cultures of Calanus in relation to the ecology of this species showed that: (a) removal of the culture dishes from constant low tempto room temp. for daily periods as great as 120 min. was not harmful to the copepods; (b) growth was poorer at 3°C than at 6 to 9°C, but survival was better at the lower temp.; (c) both growth and survival decreased regularly in passing from expts. conducted in the spring to those

in the autumn. Measurements of the respiration of Calanus using the Winkler method and the Dixon-Haldane respirometer showed that the magnitude of the O₂ requirement for these animals is of the same order as for those tested by Marshall, Nicholls, and Orr, and possibly is higher than previously reported. The discrepancy between the estimated food requirement of Calanus and the average abundance of diatoms therefore still exists but certain possible explanations are discussed.—Auth. summ.

12607. GILLAM, A. E., M. S. EL RIDI, and R. S. WIMPENNY. The seasonal variation in biological composition of certain plankton samples from the North Sea in relation to their content of vitamin A, carotenoids, chlorophyll, and total fatty matter. Jour. Exp. Biol. 16 (1): 71-88. 1939.—A combined chemical and biological study of the plankton of the southern North Sea was made. 3 vertical hauls, with a Hensen net (silk cone, 60 meshes to the inch) were taken at 6 positions between Flamborough Head and the South-West Patch of the Dogger Bank, monthly from Jan. to Nov., 1936. One haul was used for biological examination, the 2d for detas. of % of ethership to the control of the pattern and the 2d to determine controlled abloration. soluble matter and the 3d to determine carotenoids, chloro-phyll, vit. A and total solids. The biol. results showed that the total plankton depended on 3 diatom outbursts, the largest in May, another little inferior in numbers in Aug., and a small one in Oct. Peridinians and the zooplankton occurred successively in relatively greater numbers with each outburst, but reached their maximum in Aug. when the mass of the plankton was at its greatest. Carotene, chlorophyll and vitamin A were detected in the gross plankton extracts; positive tests for fucoxanthin were obtained only on a few isolated occasions. An examination of a large phytoplankton sample (obtained by tow net) containing Rhizosolenia styliformis and Biddulphia sinensis only, showed that no vit. A as such was present. Carotene and xanthophyll, however, were present, in the ratio of 1:1.82, which is comparable with the ratio typical of land plants. Total carotenoids equalled 0.1% calculated on dry weight. Of the chemical constituents, the seasonal variation of chlorophyll most nearly coincided with the total mass of the plankton. The carotenoids reached their peak slightly before the maximal biological development; the vit. A content reached its maximum in the month after the spring diatom outburst and much preceded the maximum for the

plankton crop as sampled by the Hensen net.—Auth. summ. 12608. THIEL, M. E. Naturgeschichte des Seemooses. Handbuch Seefisch. Nordeuropas 3(3): 1-34. 25 fig. 1938.— The term sea-moss, as used by the author, includes all technically related hydroid colonies; but the discussion is primarily concerned with Sertularia, as Abietinaria and Thujaria are taken only incidentally in the fishery. Systematically, the species of true sea-moss belong to one of the 3 sub-families of Sertularidae. The structural characteristics, life history, and geographical distribution of the group are adequately and non-technically described. Commercially, Sertularia cupressina and S. argentea are the important species. They are taken on certain "sea-moss banks" with specially designed tow rakes.—S. R. Hatton.

LIMNOLOGY

(See also in this issue Entries 13723, 14220)

12609. EGGLETON, FRANK E. Fresh-water communities. Amer. Midland Nat. 21(1): 56-74. 1939.—Two fundamentally different concepts of the interrelationships of organisms and their environment have influenced ecologists. One view stresses the habitat, the other the organisms. The central theme of Limnology is biological productivity. Diversity of fauna and habitats is a marked characteristic of fresh waters. This has resulted in many systems of classification for these habitats and their biotic communities. Lotic communities vary greatly in different types of streams. In intermittent streams the biota is restricted by the peculiar exigencies of the habitat. Species are few and populations manifest marked fluctuations. One of the most powerful factors in lotic communities is current. Lentic communities are of 2 general types—limnetic and benthic. The open waters support groups of organisms which fall into 3 major kinds: neuston, plankton, and nekton. The substratum under the waters from shore-line to deepest

water exhibits 3 well-defined regions—littoral, sublittoral, and profundal. Each of the situations offers a wide variety of habitats and the biotic communities vary accordingly. Present trends of fresh-water investigation are following two well-marked aspects of emphasis. One of these is concerned with applied limnology, the other with basic research. Much more fundamental is the cleavage on the point of emphasis into 3 major phases—the environmental, the biotic, and the truly limnological. A combination of the first 2 is urged as the desirable approach and the most recent development within the field, viz., exptl. work both in the lake and in the laboratory is regarded as especially promising and important. It is high time the subject ceased to be purely observational and began to seek causes.— F. E. Eggleton.

12610. GESSNER, F. Die Phosphorarmut der Gewässer und ihre Beziehung zum Kalkgehalt. Internat. Rev. ges. Hydrobiol. v. Hydrogr. 38(3/4): 202-211. 1 fig. 1939.—Since Ca₃ (PO₄)₂ is less soluble than CaCO₃, addition of the latter substance to natural waters should cause a removal of P from soln. This is confirmed experimentally; an approx. linear relation between addition of CaCO₃ and fall in P-content is found. Expts. also show that the removal of bicarbonate from soln. by plants, which under certain circumstances (high Ca) leads to the deposition of CaCO₃, also causes a reduction in P. It is suggested that this phenomenon characterizes the "alkalitrophic lakes" of Naumann's classification, and is in part responsible for the general, nearly world-wide deficiency of P in natural waters.—E. S. Deevey.

12611. MEUCHE, ALFRED. Die Fauna im Algenbewuchs. Nach Untersuchungen in Litoral ostholsteinischen Seen. Arch. Hydrobiol. 34(3): 349-520. 9 fig. 1939.—The fauna of the lasion, or attached mats of material formed of living or dead organisms, was studied in 28 freshwater lakes rich in Ca (over 26 mg/l), in 3 intermediate lakes, in 9 Ca poor lakes (under 10 mg/l) and in 2 brackish lakes. 514 different forms were definitely identified to spp. in 130 samples; 43 spp. came from brackish water, of which 7 were stenohaline forms. Fresh algal growths in May yielded only 22 spp., while similar habitats in Nov. contained 36 spp. and immersed growths as many as 52 spp. The density of the animal population depended upon the amt. of suitable food in the mat. Very few forms were found in the parts of the mat that projected above the water. Many pool forms were present in the mats. The various forms were divided into 3 ecological groups: lasiobiont, lasiophil and lasioxen. 21 spp. had not previously been reported from Germany. 6 new spp. (described elsewhere) were found in the material.—G. E. Hutchinson.

12612. MOZLEY, A. The Quill Lakes basin, Saskatchewan, Canada, and its molluscan fauna. Internat. Rev. ges. Hydrobiol. u. Hydrogr. 38(3/4): 243-249. 1939.—The basin studied includes Big Quill Lake (29 × 17 km.). Little Quill Lake (24 × 10 km.) and several small, normally undrained bodies of water of either permanent or temporary character. A progressive increase in dissolved material is noted as the hydrographic gradient is followed from the periphery to the center (Big Quill Lake). Foam Lake, a small, fresh (total solids 664 p.p.m.) body of water near the periphery, shelters a molluscan fauna consisting of Lymnea stagnalis jugularis, L. palustris, L. caperata, Planorbis trivolvis, P. exacuous, P. arcticus, Physa gyrina, all of which, together with Musculium securis and Pisidium spp. are found in permanent streams within the basin. L. palustris and L. caperata are also found in temporary streams. Lymnea palustris and Physa gyrina were found living in Little Quill Lake (total solids ca. 9,500 p.p.m.); shells of 6 other spp. were found on the shore. One of these, Planorbula campestris, is confined to astatic ponds, and it is suggested that all the shells were introduced by streams and deposited by waves. No mollusca were found living in Big Quill Lake (total solids ca. 16,000 p.p.m.) and shells of L. palustris only were found on the shore. The usual sequence of aquatic habitats within the basin is believed to be: temporary ponds—intermittent streams—fresh-water lakes—permanent streams—saline lakes.—E. S. Deevey.

12613. PICHLER, W. Unsere Kenntnis von der Thermik

Heiner Gewässer. Thermische Kleingewässertypen. Internat. Rev. ges. Hydrobiol. u. Hydrogr. 38(3/4): 231-242. 3 fig. 1939.—Small bodies of water are newly defined on thermal grounds as "bodies of water lacking permanent thermal stratification during the warm season." A review of published data together with original observations in the Alps permits a classification into: (1) Puddles (Lachen)—practically no thermal stratification, maximum diurnal temp. variation in summer 25° C, maximum depth 20 cm., bottom receives strong solar radiation. (2) Pools (Tümpel)—thermal stratification interrupted daily by homothermy, maximum temp. variation at surface 15° C, at bottom 5° C, maximum depth 60 cm., bottom receives weak but detectable solar radiation. (3) Ponds (Weiher)—thermal stratification frequently interrupted by storms, maximum temp. variation at surface 10° C, at bottom 2° C, maximum depth over 1 m., bottom receives no detectable solar radiation.—E. S. Deevey.

12614. STEINBÖCK, O. Arbeiten über die Limnologie der Hochgebirgsgewässer. Internat. Rev. ges. Hydrobiol. u. Hydrogr. 37(4/5): 467-509. 14 fig. 1938.—The author reviews 10 years of research on alpine and rolar limnology.

reviews 10 years of research on alpine and polar limnology, adding much unpublished material. Kryokonite holes are described with emphasis on the "polar" type, typically developed in the pack ice of eastern Greenland (Scoresby Sound). The polar type bears no constant orientation to the sun, and in marine ice the contents are chiefly of organic origin. The organic kryokonite is grayish, primarily composed of diatoms, but when examined in the field other forms are found, e.g., the red snow alga (Chlamydomonas nivalis) and Protozoa including Actinospherium sol and spp. of Colpidium, Glaucoma, and Didinium. Other examples of the polar type are described from the land glaciers near Scoresby Sound, but the organic component is less important, consisting of plant fragments, presumably windblown algae (Mesotaenium (Ancylonema) nordenskjoldi; Chlamydomonas) and the Protozoa Paramecium, Didinium, and Stylonychia. The kryokonite from these holes resembles that of the "alpine" type, as descr. from western Greenland, in the predominance of inorganic material, or "dust," but the alpine type differs from the polar in being "dust," but the alpine type differs from the polar in being oriented toward the sun's rays. Glacier-margin lakes are divided into 2 groups on the basis of their colonization by macroscopic organisms, and the differences are ascribed to varying amts. of glacial detritus. The first colonists are Chironomids (esp. the boreoalpine Syndiamesa pubitarsus) and the "glacier flea," Isotoma saltans, which frequently lives on the surface film. A typical example of a more productive clearer glacier-margin lake that beside the productive, clearer glacier-margin lake, that beside the Finstertaler Scharte (2,700 m.), is descr.; under strong insolation shore temps, as high as 7° C were observed. Glacier streams are defined as alpine streams characterized by a heavy load of glacial detritus and an extreme paucity of fauna. The classification of alpine streams is very difficult, and it is suggested that in at least one case the boundary between glacier stream and clear alpine stream is fixed by the vertical range of the trout (Salmo (Trutta) fario). The fact that this faunistic boundary does not fluctuate with the seasonal variations in load can not yet be explained. In the section on alpine lakes, attention is primarily directed to the lakes of the Kühtai region. Those lakes between 2,000 and 2,500 m. are very diverse in hydrography and fauna; 5 lakes contain Salmonids, whose growth rates in the several lakes may be very different; plankton forms a wholly subordinate constituent of the diet of these fish; the bottom fauna is unexpectedly rich and is composed principally of oligochaets and Chironomids. The average number of organisms per sq. m. is: Vorderer Finstertaler See (2,235 m.) 440; Gossenkellensee (2,463 m.) 1,680; Oberer Plenderlesee (2,400 m.) 1,054. These values compare favorably with those from certain of the N. German lakes. Bottom fauna data are also given for the Winnebachsee (2,360 m.), which has an average of 727 organisms per sq. m. Bottom organisms are believed to provide the major food supply for the Salmonid fish. In constructing a scheme for the classification of permanent bodies of standing water in alpine regions, the author rejects criteria of size and morphometry, and relies on thermal characteristics. The proposed classification is believed to have faunistic corollaries, in that the copepod Diaptomus bacillifer, the turbellarian Castrada luteola, and the rotifer Euchlanis dilatata are characteristic of alpine lakes, while the rotifer Brachionus is characteristic of pools.—E. S. Deevey.

12615. STRØM, K. M. Conductivity and reaction in Norwegian lake waters. Internat. Rev. ges. Hydrobiol. u. Hydrogr. 38(3/4): 250-258.2 fig. 1939.—Specific conductivity and pH values are tabulated for 26 Norwegian lakes, and analysis is based upon regional differences in lithology. Regional peculiarities are more striking in the data on conductivity, notably in respect to the extreme softness of the waters of the northwestern valley lakes. Conductivity measurements are believed to reflect the character of the underlying rocks, rather than of the uppermost soil. The influence of glacial drainage in raising pH values obscures the more fundamental relation between lithology

and water type.—E. S. Deevey.

12616. ULLYOT, P. Die täglichen Wanderungen der planktonischen Süsswasser-Crustaceen. Internat. Rev. ges. Hydrobiol. u. Hydrogr. 38(3/4): 262-284. 17 fig. 1939.—Analysis of vertical migration of Cyclops strenuus in Windermere, England, during two 24-hr. periods in 1933, was accompanied by approx. simultaneous determination of light-penetration. The Bernheim photometer was employed for the latter investigation, and the use of ray-filters permitted consideration of the penetration of different wavelengths. The diurnal migration within a 40-m. vertical distance was shown to be dependent on varying lightintensity, and the downward migration to be initiated by negative phototropism in strong light of \(\lambda\) 4,000-5,000 A (blue). The occurrence of 2 maxima of Cyclops at the surface, one at dawn and the 2d at dusk, together with the fact that considerable light falls on the surface at night, suggests that the upward migration is caused by positive

suggests that the upward migration is caused by positive phototropism in weak light.—E. S. Deevey.

12617. VORNATSCHER, JOSEF. Faunistische Untersuchung des Lusthauswassers im Wiener Prater. Internat. Rev. ges. Hydrobiol. u. Hydrogr. 37(4/5): 320-363. 5 fig. 1938.—The "Lusthauswasser" is the abandoned lower segment (length 1 km., width 30-70 m.) of the Vienna Danube Canal, separated from the main stream in 1875. The water level fluctuates with that of the adjacent river, as it does in 2 astatic bodies of water in the vicinity, the "Sandgrube" and the "Weg." Historic and botanical descriptions are given, temp. is briefly discussed, and faunistic studies are summarized by taxonomic groups, with reference to place and season of occurrence. Major groups are: Protozoa (61 spp.); Turbellaria (8 spp.); Rotatoria (15 spp.); Cladocera (33 spp.); Copepoda (18 spp.); Hydracarina (10 spp.); Insecta (102 spp.). Faunistic differences were observed among the 3 localities, notably in respect to Coleoptera; Hydrophilids (9 spp.) were confined to the Lusthauswasser, while 7 Dytiscids occurred only in the Sandgrube, 9 were restricted to the Lusthauswasser, and 8 were common to both. The fauna is classified ecologically under the following categories: ground-water, in mud, over mud, floating wood, surface film, on plants.—E. S. Deevey.

WILDLIFE MANAGEMENT-AQUATIC

(See also the section "Pisces"; and Entry 12639)

12618. ALLEN, K. R. A note on the food of pike (Esox lucius) in Windermere. Jour. Animal Ecol. 8(1): 72-75. 1939.—An examination of stomach contents of 103 pike showed they fed extensively on 4 of 7 abundant fish in the lake, but especially on perch which appeared particularly susceptible to their attacks. The only invertebrate food taken to any extent was hatching nymphs of Ephemera danica. The percentage of pike with empty stomachs was high at all times, but especially high in winter.—S. C. Kendeigh.

12619. BARROWS, MAYNARD B. Elimination of Yellow Perch from a lake by use of derris root. Jour. Wildlife Management 3(2): 131-133. 1939.—Perca flavescens. A 37½ acre lake was treated with 540 pounds of derris root, of 5% rotenone content, distributed chiefly from motor boats. The derris powder was also wrapped in dynamite bombs for deep-water treatment and applied around the shoreline by prod poles. First effects were noted in 20 min. and

action was complete in 24 hrs. From subsequent observations, it was concluded that all fish had been killed.—M. B. Barrows.

BIGELOW, HENRY B., and WILLIAM C. SCHROEDER. Notes on the fauna above mud bottoms in deep water in the Gulf of Maine. Biol. Bull. 76(3): 305-324. 1939.—A survey of the possible shrimp-fishing areas in the Gulf of Maine was made by the Woods Hole Oceanographic Institution under the leadership of Johan Hjort. Using otter trawls of the sort used in the Norwegian shrimp fishery, at 20 stations, it was found that the faunal community just above mud bottom (in depths of 120-228 m.) munity just above mid bottom (in depths of 120-228 m.) consisted chiefly of 5 spp. (Sebastes marinus, Merluccius bilinearis, Urophycis tenuis, Hippoglossoides platessoides, Glyptocephalus cynoglossus) and the shrimp, Pandalus borealis. At one station crabs (Geryon) outnumbered shrimp. Odd examples of 19 spp. (Myxine glutinosa, Squalus acanthias, Raia senta, R. stabuliforis, R. scabrata, Clupea harvenus, Artalulus surginatus, Caulonterus human, Luca harengus, Artediellus uncinatus, Cyclopterus lumpus, Lumpenus lampetraeformis, Cryptacanthodes maculatus, Pollachius virens, Gadus callarias, Melanogrammus aeglefinis, Urophycis chuss, U. chesteri, Enchelyopus cimbrius, Brosme brosme, Macrourus bairdii, Lophius americanus) were also caught. The center of the shrimp population in summer lies in the deep bowl west of Jeffries Ledge, the abundance being correlated with the amt. of organic matter in the mud. Merluccius was also plentiful there, presumably in pursuit of shrimp. The stock of Merluccius was dominated by the yearling—an age group whose habitat in the Gulf of Maine was previously unknown. The other 4 abundant fish were chiefly 2 years old or more and were not restricted to any particular locality. Length-frequency studies of Sebastes (with previous information) show the average length to be 7.5 cm. for yearlings, and 18 cm. at the age of 2 years. Yearlings of Merluccius average about 17 cm. and the 2-year olds about 25 cm. The estimated combined weight of shrimp and fish in the bowl west of Jeffries Ledge at depths greater than 150 m. averaged 576 lbs. per 1.5 sea miles with an 82-foot trawl, or 55 lbs. per acre of bottom had the 6-inch stratum next the sea floor been included.— M. Sears.

12621. BROWN, C. J. D., and CHARLES BUCK, Jr. When do trout and grayling fry begin to take food? Jour. Wildlife Management 3(2): 134-140. 1939.—The exptl. fry were kept in standard hatchery troughs (water temp. 47°-52°F) and fed on finely ground beef liver and hearts and salmon carcass meal. Stomach examinations after food was offered show the earliest feeding time from the hatching date to be for: Brown trout (Salmo trutta) 23 days, rainbow trout (S. gairdnerii irideus) 16 days, cutthroat trout (S. lewisi) 14 days, brook trout (Salvelinus fontinalis) 23 days, and grayling (Thymallus montanus) 4 days. The presence or size of the yolk sac showed no correlation with the initial feeding time in the species studied.—C. J. D.

12622. BURGER, J. WENDELL. Some experiments on the relation of the external environment to the spermatogenetic cycle of Fundulus heteroclitus (L.). Biol. Bull. 77 (1): 96-103. 2 pl. 1939.—No differences in the velocity of the spermatogenetic cycle were found between control and exptl. fish subject to the following photoperiodic manipulations provided adequate nutrition was furnished and provided the water temp. (variable between 11° and 18° C) was the same for both groups. The photoperiodic manipulations were: a) 21 days of decreased lighting between June 30 and July 22, b) 37 days of increased lighting between June 30 and July 22, b) 37 days of increased lighting between June 30 and July 22, and Aug. 27 to fish previously treated as in (a), c) 68 days of increased lighting between Oct. 29 and Jan. 4. Sexually inactive fish which received no more than 1½ hrs. of light per day rapidly formed when kept in water whose temp. ranged between 14° and 20° C. Fish similarly treated remained sexually inactive when kept in water of 6-10° C. The temp. of the water is evidently the primary factor of the external environment that influences the spermatogenetic cycle. Light as light seems incapable of effecting this cycle.—J. W. Burger.

12623. ELSTER, H. J. Über die Bewirtschaftung des Bodensees. Internat. Rev. ges. Hydrobiol. u. Hydrogr. 37 (6): 529-570. 1938.—Concerning himself exclusively with

the "Blaufelchen" [Coregonus wartmanni] fishery, the author presents an analysis of present knowledge, current methods, and future management measures, a presentation which is in large part a critique of the conclusions of Wagler. Early in the history of the scientific management of the lake it was shown that the older age-groups are lacking. That this fact indicates an approximately constant ratio between actual population and the intensity of the fishing has been shown by the elimination of several possible alternatives. Older fish can be caught when present, as during years of large catch; no differences in age-frequency are observed within a vertical range of 40 m; distribution of age-frequency in samples taken by different commercial methods is parallel. Although no change of habit with increasing age can be demonstrated, the importance of unequal horizontal distribution can not yet be evaluated. The intensity of fishing can be assessed accurately by ageclass statistics, and these statistics show that the annual crop depends upon the size of the year-class, and especially on the number of 3-yr.-olds. Particularly large year-classes are also caught as 4-yr.-olds. Certain criticisms of the calculated growth-curve are presented. The calculated calculated growth-curve are presented. The calculated values are free from the influence of selection, when catch data are employed, and the inception of sexual maturity is not adequately provided for by derived growth-curves. Insufficient evidence is found for the view of Wagler that a specific growth-curve characterizes each Coregonid spp., independent of the lake inhabited. In discussing questions of plankton productivity and optimum nourishment for fish the author calls attention to the unreliability of available plankton determinations, and to the variations in the growth rate of the fish in different years. Data presented by Nümann indicate an inverse relation between individual growth-rate and annual crop. In shallow ponds the maximum areal yield of fish is obtained at a population-density which inhibits maximal individual growth. No evidence is believed to exist for Wagler's opinion that growth-variations are determined by temp. rather than by food supply. The evidence accumulated by Wagler, indicating a marked reduction in yield since the Middle Ages, is viewed with considerable skepticism, and Wagler's estimated maximum production for a *Coregonus* lake of 7,500 kg. per sq. km. is not accepted; the author considers it unlikely that the maximum yield of modern times, ca. 1,100 kg. per sq. km., can be greatly exceeded. Measures for the improvement of the yield are discussed, and while the desirability of raising the legal length is recognized, experience in 1937 has shown that this is impracticable while the hawser net (Klusgarn) is used. As a temporary expedient quotas have been imposed, but the prohibition of the hawser net is regarded as the only permanent solution; the suspended net (Schwebsatz) will then be favored, and the legal length can be raised. Artificial reinforcement of natural spawning is regarded as a method for equalizing the loss incurred through the capture of mature fish before spawning has taken place, and through egg-predation by the Trüsche [Lota vulgaris]. It is hoped that the reinforcement will be especially effective if the rearing of the young fish is prolonged in large aquaria well-stocked with food.—E. S. Deevey.

12624. FOWKE, PHILIP. Trout culture in Ceylon. Ceylon Jour. Sci. Sect. C, Fish. Bull. Ceylon Fish. 6: 1-78. 16 pl. 1938.—First attempts to introduce brown trout in 1882 and subsequent attempts from 1886 to 1889 using ova were not successful. In 1892-93 ova were again imported and these efforts were successful. Ova of rainbow trout were first imported in 1899 and this sp. bred freely in elevations of 7,200 feet. The probable lower limit of successful breeding is about 5,800 feet. Except during cold yrs. brown trout breed naturally only occasionally in Ceylon. In the hatchery stream water is preferred over spring water but special filters must be provided to eliminate sediment. Two gravel filters in tile-lined concrete troughs are used. Each filter will handle 300 gallons per hr. Chief causes of mortality are strangulation, starvation, overheating, dropsy, ulcers, fin disease, black ophthalmia, fungus and cannibalism. Ceylon waters are as a rule deficient in lime and this is corrected by placing coral in the water. Gyrodactylus at times becomes serious. Once the disease gets established in

a pool larger trout are most seriously attacked. After 2 months the fry are sorted and placed in nursery ponds where they are held for a yr. before being placed in streams. Fresh liver, heart and beef are staple foods, the quantity fed varying with the temp. between 50° and 60°F; 2-3 lbs. per day are given each thousand fish 3-5 in. long; and 4-8 lbs. for each thousand 8-12-inch fish. Fresh shrimp are used to vary the diet and are highly desirable as are small blood worms found in polluted streams. Best results in stream stocking are obtained with 5-6 inch fry. Transportation difficulties prevent stocking large fish. Large containers are infeasible because some transportation is by man-power. Heavy timber cutting and forest fires on the watersheds of trout streams resulted in erosion which seriously damaged the streams as trout habitat. The injury persists many years after reforestation. Survival in streams damaged by this erosion is extremely small. Stream improvement includes temporary log and sand bag weirs as well as permanent masonry structures. Because the natural stream fauna in Ceylon has developed without predatory fish, extreme care must be used to prevent overstocking with trout and subsequent elimination of food organisms. Brown trout only are stocked at high elevations where low temps. inhibit growth of food organisms. Since brown trout seldom breed in Ceylon, populations are easily controlled. At lower elevations where food production is higher, rainbow trout are stocked and population control achieved by netting or heavy fishing. Exhaustion of indigenous food supply because of overstocking is considered a major catastrophe. Some attempt has been made to study fish movement by means of marked fish but these attempts have been generally unsatisfactory. Rainbow trout commonly disappear from the higher trout streams after attaining large size. Scale and vertebrae counts indicate the trout called "rainbow" are in fact "cut-throat" trout and hence migrate to the sea. There is no evidence that the trout return once they have gone to the sea. Natural enemies include the otter, the brown fish owl, kingfishers and cormorants. Poisoning or drugging of fish is a common method of poaching employed by natives. In 17 years 3½ miles of water has yielded 91,927 fish. Sizes range up to 14 pounds, 4½ ounces.—I. H. Sims. 12625. HICKLING, C. F. The selective action of the drift-

12625. HICKLING, C. F. The selective action of the driftnet on the Cornish pilchard. Cons. Perm. Internat. Explor. Mer Jour. Conseil 14(1): 67-80. 1939.—Drift nets having meshes of different sizes have a well marked selective action on the pilchards caught. This action shows itself not only on the size, age, and weight of the fish caught, and on the apparent sex-ratio, but on the apparent rate of growth. The larger mesh selects the larger fish of each age, thus giving a higher apparent rate of growth than is found among the fish selected by the smaller mesh. Further, the apparent rate of growth is affected through the agency of "Lee's phenomenon," since the smaller mesh selects the younger fish, the larger mesh the older fish.—C. F. Hickling.

12626. HUNTSMAN, A. G. Salmon for angling in the Margaree river. Fish. Res. Bd. Canada Bull. 57. 1-75. 1939.—Low catches of salmon (Salmo salar) in the river early in the season (June to Aug.), while nets are operated on the coast outside, are not due to the nets but depend upon sea temp., wind, shape of estuary, and freshets. Capture by coastal nets affects angling only by decreasing the abundance of the salmon stock as a whole along the coast, or of a lot of salmon that happens to be exposed to conditions causing their entrance into the river. The results of tagging salmon from the nets in 1935, 1936 and 1937 show that elimination of the 10 nets nearest the river, taking 800 to 1,000 salmon per year, would add from 30 to 90 salmon per year to the angling catch, an increase of perhaps 3.5 to 5%. Low winter temp, of the neighbouring sea, in part the result of drifting ice, prevents the salmon appearing on the coast until about the beginning of June. Onshore (northwesterly) winds concentrate the salmon along the coast. Salmon concentrate where the sea has the greatest proportion of water from the river, e.g., near the narrow mouth of the estuary with out-flowing estuarial water during ebb-tide. Northerly wind holds this close to the mouth, facilitating entrance of the salmon. In currents turbulent from contact with stationary objects, salmon point up-stream and gain or lose ground as the strength

of the current is less or more than their cruising speed. Increased flow or turbulence incites them to greater activity, even to the leaping of falls, thus causing them to ascend rivers. Freshets therefore are important, the salmon ascending as the freshet subsides.—A. G. Huntsman.

12627. JANSSEN, JOHN F. Jr. Two years of sardine tagging in California. Cons. Perm. Internat. Explor. Mer Jour. Conseil 14(1): 48-66. 7 fig. 1939.—From March, 1936 to June, 1938, 53,352 sardines were tagged on the coast of California. The tag used is a nickel plated steel strip placed inside the body cavity of the fish. It is recovered by means of electro-magnets in meal lines of sardine reduction plants. Up to July, 1938, these tags have yielded 1,334 recoveries. Most returns have been from fish caught soon after tagging in the same fishing region as tagged. However, 258 tags from southern California fish have been recovered in central California, and 30 in Oregon, Washington and British Columbia. Conversely, 10 British Columbia tags and one Oregon tag have been taken in California. In addition, 8 central California tags were recovered in southern California. These recoveries indicate a summer northward movement and a southward movement during the late fall and winter. Recoveries show that the larger fish make longer migrations. An as yet unknown proportion of the tags is not recovered due to shedding of tags, death of fish as a result of tagging, and inefficiencies in the methods of recovery.—J. F. Janssen, Jr.

12628. MacGINITIE, G. E. Some effects of fresh water on the fauna of a marine harbor. Amer. Midland Nat. 21 (3): 681-686. 1939.—The combined effect of flood waters from a break in the levee of the Santa Ana River and the run-off from the hills surrounding Newport Bay, California, in March, 1938, killed a great many marine animals within the harbor, while others were able to endure the exposure to the fresh water without any apparent ill effects. In the yacht anchorage about 2 miles from the entrance of the bay the animals were killed to a depth of 6 ft. 9 in., which indicates that the border line between the floating fresh water and the underlying ocean water may be sharp. A table listing the effects on the more important animals is given. In general, animals which are tubicolous or live in burrows underground are unharmed, while the unprotected animals are, for the most part, killed. Ten months later a rechecking of the marine life within the bay showed that all animals were again re-established and abundant.—G. E. MacGinitie.

12629. MARSHALL, S. M., A. G. NICHOLLS, and A. P. ORR. On the growth and feeding of young herring in the Clyde. Jour. Marine Biol. Assoc. United Kingdom 23(2): 427-455. 1939.—Two groups of young herring (Clupea harengus) are found in the Clyde. One, the offshore group. has been identified as Clyde spring-spawned herring; the other, the inshore type, is of unknown origin. The 2 groups are distinguished by differences in size and identified as belonging to different races by vertebral counts. The off-shore herring which metamorphose at the end of May when 40-50 mm. long reached a length of 90-100 mm. in winter. The inshore fish which were about 50 mm. long in May reached a length of about 130 mm. in winter. Equations are given showing the relation between length and weight for inshore and offshore herring during the growing and non-growing periods. Determinations were made of water, fat, protein and ash contents of inshore herring. The fat content rises in summer and falls during the winter. It varies inversely with the water content. The fat content continues to increase for some weeks after growth in length has stopped in winter and rises also in spring some time before increase in length begins again. The food was examined throughout the year and compared with plankton hauls. It consisted mainly of copepods although other organisms were common at times when abundant in the plankton. A series of hauls made over a night showed that herring were most abundant inshore at dusk and dawn and contained most food from 7-11 p.m.—Authors.

12630. MATTHEWS, SAMÜEL A. The effects of light and temperature on the male sexual cycle in Fundulus. Biol. Bull. 77(1): 92-95. 1939.—Male Fundulus maintained in a light-proof tank developed sperm at the same time as

did control animals in the light. Those maintained at 5.5° C showed retardation of spermatogenesis as compared with

animals kept at 21°.-S. A. Matthews.

12631. ROUGHLEY, T. C. A review of the scientific investigation of the fisheries of New South Wales. (Presidential address). Proc. Linn. Soc. N. S. Wales 64(1/2): ixxvii. 1939.—A brief review of the following investigations is given: (i) The Commonwealth trawling investigations from 1909 to 1914, which paved the way for commercial trawling on the Australian coast; and the development of the trawling industry. (ii) Recent investigations of the productivity of the sea in the neighbourhood of Sydney as detd. by the quantity and the fluctuations of the plankton; the influence on the plankton of the phosphate and nitrate content of the water; and a comparison of the plankton production and variation compared with that of the English Channel and the North Sea. (iii) The spawning and development of the Australian pilchard (Sardinops neopilchardus); the growth and food types of the tiger flathead (Neoplatycephalus macrodon), the principal foodfish caught by the New South Wales trawlers; the breeding habits and life history of the king prawn (Penaeus plebejus); the artificial propagation of the Murray cod (Maccullochella macquariensis); the investigation of a winter mortality of oysters, and the life history of the commercial oyster of New South Wales (Ostrea commercialis). Finally, the plan and scope of the investigations of the Fisheries Section of the Council for Scientific and Industrial Research are discussed.—T. C. Roughley.

12632. WHITE, H. C. Bird control to increase the Margaree river salmon. Fish. Res. Bd. Canada Bull. 58. 1-30. 8 fig. 1939.—Analyses of 591 stomachs and stomach pellets of wild birds feeding along salmon (Salmo salar) streams (551 from the Margaree river, Cape Breton Island) indicated that fish-eating birds, particularly kingfishers (Megaceryle alcyon) and mergansers (Mergus spp.) were removing a large proportion of the young salmon. A conservative estimate was that in 1935 at least 880,000 young salmon and trout were required by these species for rearing their young along the Northeast branch of the Margaree river. An expt. to test the effectiveness of control of fisheating birds in increasing the numbers of salmon smolts descending toward the sea was carried out on Forest Glen brook which is a tributary of the Northeast Margaree and drains a high tableland about 30 sq. mi. in area. Following years of unrestricted feeding by the birds, 1,834 smolts were taken by trap when leaving the brook in the spring of 1937. The birds were eliminated for one year, thus protecting during their last year in the brook the young salmon descending the next spring, over 90% of which were 3 yrs. old. When trapped and counted in the spring of 1938 these smolts numbered 4,065, an increase of more than 120% over

the number without bird control. The trout (Salvelinus fontinalis) also increased in numbers in the brook and the larger of these ate the young salmon even in the smolt stage.-A. G. Huntsman.

WILDLIFE MANAGEMENT-TERRESTRIAL (See also the section "Aves"; and Entries 12469, 12632, 14202)

12634. HAMERSTROM, F. N. Jr., and JAMES BLAKE. Central Wisconsin muskrat study. Amer. Midland Nat. 21(2): 514-520. 1939.—Muskrats (*Ondatra zibethica*) on the 100,000 acre Central Wisconsin Game Project, Necedah, were practically confined to 200 miles of drainage ditches, as the result of an earlier drainage-for-agriculture boom. Repeated surveys during 2 springs, 2 summers, and 1 autumn showed that (1) ditches which cut through shallow marshes and low sand islands provided the best muskrat habitats, (2) well shaded and swift-running main ditches, and those through deep peat, were inferior, (3) water losses, from a spring flood stage, continued throughout the year, greatly reducing the potential muskrat range, (4) shallow ditch heads and laterals were preferred for breeding but dried up during summer, resulting in a constantly shifting population, (5) beaver ponds and water holes in bends and behind drift jams gave a scattering of fairly permanent breeding areas, (6) winter losses, because of unbalanced food and water supplies, were drastic. 3 important winter foods were noted, namely Carex crinita, C. rostrata, and tubers of Lycopus uniforus, the last of which was heavily eaten at all seasons. Food habits for all seasons are discussed. More constant water levels and a better distribution of winter foods are needed to correct the situation .- F. N. Hamerstrom, Jr.

12635. PARKINS, A. E., and J. R. WHITAKER (Editors). Our natural resources and their conservation. 2nd ed. xiv-647p. 118 fig. John Wiley and Sons, Inc.: New York, 1939. Pr. \$4.—This revised edition of a collaborative work of 23 contributors affords an opportunity for reduction duplication and for cross references not feasible when the first edition (1936) was issued. Statistical data have been brought up to date wherever available. A number of chapters have been revised and a new one on fisheries of the future has been added. In the interval between editions, progress in the fields of crop control and soil conservation has been extensive and significant. Cooperation of sportsmen with wildlife conservationists has developed. Great advances have been made in the development and utilization of recreational facilities. Science has made possible noteworthy advances in utilization of wastes especially in the recovery of metals, better conservation of coal, petroleum and its products, and in the conservation of human life.—C. A. Kofoid.



Action Wall

PALEOBOTANY

EDWARD W. BERRY, Editor

(See also B. A. 13(7): Entries 10680, 11853; and in this issue 13854)

13715. ANDREWS, H. N. Notes on the fossil flora of Yellowstone National Park with particular reference to the Gallatin region. Amer. Midland Nat. 21(2): 454-458. 2 pl. 1939.—A collection of fossil wood was made in the northeast corner (Gallatin region) of Yellowstone Park in 1936. Numerous stumps, probably sequoian, were measured which had an age greater than 860 yrs. at the time of fossilization. Sequoia magnifica and Cupressinoxylon lamarense are both abundant. Wood of the latter species was found in which the preservation is somewhat better than that described for the type. Woods of both soft and hard pine affinities were also found.—H. N. Andrews.

13716. ARNOLD, C. A. Observations on fossil plants from the Devonian of eastern North America. IV. Plant remains from the Catskill Delta deposits of northern Pennsylvania and southern New York. Contr. Mus. Paleont. Univ. Michigan 5(11): 271-314. 10 pl., 1 fig. 1939.—The plants described are from 13 widely separated localities principally throughout the northern counties of Pennsylvania and adjacent New York. The plant-bearing formations range from the Hamilton to the Cattaraugus. Throughout the Upper Devonian portion of the Catskill Delta Archaeopteris and Callixylon occur along with scattered lycopods and other types of undetermined relationships. Psilophyton, though frequently reported, has not been definitely recognized within this area. The lycopods consist of Archaeosigillaria primaeva, Knorria chemungensis, PROLEPIDODENDRON breviinternodium, and undetermined fragments of Protolepidodendron sp. Barinophyton citrulliforme is represented by well preserved fertile stems. The sporangia contain large spores, and the genus is believed to be congeneric with Pectinophyton of Norway and Germany. Its affinities are undetermined. Hostimella crispa and Aphyllopteris dela-warensis are leafless plants with curled lateral and terminal appendages. They may be related to the Psilophytales. Archaeopteris is represented in the flora by 8 species, 2 of which are of questionable status. A. halliana, which includes A. minor, is comparable in many respects to A. roemeriana of Europe, and A. latifolia resembles A. hibernica except for being smaller and having more rounded pinnules. A. latifolia is apparently heterosporous.—C. A. Arnold.

13717. BROWN, ROLAND W. Some American fossil plants belonging to the Isoetales. Jour. Washington Acad. Sci. 29(6): 261-269. 6 fig. 1939.—The finding of American

specimens bearing sporangia makes it possible to assign a number of hitherto vaguely identified Cretaceous and Tertiary fossils to the Isoetales. One new species, *Isoetites* serratus, from upper Cretaceous, Wyoming, and a new combination, *I.* horridus (*Carpolithes h.* Brown), are described.—*R. W. Brown*.

13718. CRIBBS, J. E. Cauloxylon ambiguum, gen. et sp. nov., a new fossil plant from the Reed Springs Formation of southwestern Missouri. Amer. Jour. Bot. 26(6): 440-449. 7 fig. 1939.—A description of a silicified stem with structure preserved, from the earlier Mississippian. The specimen as found is about 15 cm. long, 7.5 cm. wide, and 5.5 cm. thick. It is without branches, and all structures external to the secondary wood are lost. In many structural aspects there is a close resemblance to Pitys, but there are several differences, most of which indicate a close affinity with the Calamopityeae. The stem is interpreted as representing a new genus and species with characters mostly intermediate between the Calamopityeae and Pityeae. The name CAULOXYLON ambiguum is proposed. A discussion of relationship is included.—J. E. Cribbs.

13719. FREMY, P., et L. DANGEARD. Observations sur

13719. FRÉMY, P., et L. DANGEARD. Observations sur le Botryococcus braunii Kützing actuel et fossile. Ann. Paléont. 27(1/3): 115-136. 2 pl., 4 fig. 1938.—This paper records the discovery of spores ("grains de pollen") referred to a planktonic algae, genus Bothryoccus, from beds of uncertain age—Eocene, Oligocene or possibly Miocene—near Thuit-Herbert, to the west of the forest of Londe. Most of the paper is taken up with the discussion of the life history of the recent species B. braunii Kutz.—B. L. Clark.

13720. KIRCHHEIMER, FRANZ. Über die Botanische Zugehörigkeit weiterer Frucht- und Samenreste, besonders aus den Braunkohlenschichten Sachsens. *Planta* 29(2): 262-277. 3 fig. 1939.—Findings are described from the Miocene. Oligocene, Upper Eocene or Lower Oligocene. Most of the locations yielded forms of the Mastixiodean flora.—B. R. Nebel.

13721. MARTINOLI, GIUSEPPE. Studio su alcuni esemplari di Coniferae fossili del Gabbro (Monti Livornesi). [Fossil conifers of Gabbro (Livornese Mountains).] Nuovo Gior. Bot. Ital. 45(1): CXLVII-CXLIX. 1938(1939).—Preliminary note, mentioning 10 spp. of Miocene age. Genera represented are Taxodium, Glyptostrobus, Sequoia, Pinus, Libocedrus, and Callitris.—F. Ramaley.

ALGAE

(See also in this issue Entries 13975, 13994, 14015, 14016)

13722. DREW, KATHLEEN M. An investigation of Plumaria elegans (Bonnem.) Schmitz with special reference to triploid plants bearing parasporangia. Ann. Botany 3 (10): 347-367. 1 pl., 35 fig. 1939.—P. elegans has spermatangial, procarpic, and tetrasporic plants as is usual in the diplobiontic Florideae. In addition a 4th type of plant bearing parasporangia is frequently found. Occasionally a few tetrasporangia develop among the numerous parasporangia. Plants bearing sexual organs have 31 chromosomes and those bearing tetrasporangia 62. The result of sexual fusion is a cystocarp with diploid carpospores and there is a reduction division in the tetrasporangium. The haploid and diploid plants are undoubtedly related in the way usual in the diplobiontic Florideae. The plants which bear parasporangia (with rare tetrasporangia) are triploid. No change in the chromosome number accompanies the formation of paraspores, which like the parent plant have 93 chromosomes. No evidence has yet accrued to show whether there is any relationship betwen the haploid and diploid plants on the one hand and the triploid plants on the other. This is apparently the first cytological evidence of triploid plants in the algae. There is no evidence to show how the triploid originated. The fact that the formation of

the triploid has been accompanied by the development of a new type of reproductive body, the parasporangium, is without any doubt the reason for its survival. There is some evidence that the triploid has a wider geographical distribution than either the haploid or the diploid. The fate of the occasional tetraspores borne on the triploid and their chromosome complement are facts still to be ascertained. While both parasporangia and tetrasporangia arise from uninucleate initials, the similarity between the 2 sporangia ends there. In contrast to the tetrasporangium where there is a very orderly division of the protoplast after the 2 nuclear divisions are complete, the divisions in the parasporangium are entirely fortuitous and a cell division follows every nuclear division, of which there are several.—Auth.

13723. DROUET, FRANCIS, RUTH PATRICK, e LYMAN B. SMITH. A flora de quatro açudes da Parahyba. Ann. Acad. Brasil. Sci. 10(2): 89-103. 1938.—A list of species of diatoms, vascular plants, and Myxophyceae in the limnological collections of Stillman Wright from 4 alkaline artificial lakes at Campina Grande. Microcystis aeruginosa dominates the plankton of 3; the diatoms show affinities with those of brackish water.—F. Drouet.

13724. MAY, VALERIE. A key to the marine algae of New South Wales. II. Melanophyceae (Phaeophyceae). Proc. Linn. Soc. N. S. Wales 64(1/2): 191-215. 1939.—This paper follows the plan adopted in Part I, which dealt with the Chlorophyceae. Keys are given for the identification of the tribes, orders, families, genera and species. A tabulated list of synonyms is given for the accented species—V. May.

list of synonyms is given for the accepted species.—V. May. 13725. RAMANATHAN, K. R. The morphology, cytology, and alternation of generations in Enteromorpha compressa (L.) Grev. var. lingulata (J. Ag.) Hauck. Ann. Botany 3(10): 375-398. 74 fig. 1939.—The structure and development of the holdfast, and the life-history of the plant, as followed in laboratory cultures, are described. The gametophyte is dioecious. Sexual fusion shows all stages, from pure isogamy to definite anisogamy. The zygotes germinate without a resting period and the germlings are diploid with 20 chromosomes. The mature plants grown from zygotes produce only quadriflagellate zoospores. Reduction takes place during the formation of zoospores. A distinct spireme, a synezetic knot, and a typical diakinesis form the conspicuous features of this division. 10 bivalent chromosomes were observed at the 1st division and 10 univalent chromosomes in the subsequent ones. The zoospores develop immediately into haploid germlings with 10 chromosomes. The resulting plants produce only gametes. There is thus a regular alternation between a haploid gametophyte and a diploid sporophyte, the 2 generations being externally alike. The number of pyrenoids in diploid cells is nearly double that in haploid cells. A possible relation is suggested between the number

of pyrenoids and the chromatin content of the nucleus. Parthenogenetic development of the gametes was observed; the resulting plants were all haploid and produced only gametes. The behavior of the nucleolus during nuclear division suggests that it plays no active part either in the formation of the chromosomes or of the spindle, but that it is often pushed out into the cytoplasm. A deeply stained body, probably of the nature of a centrosome, is always present on the membrane of the resting nucleus.—The systematic position of the Ulvaceae is discussed and a possible relation to the Chaetophoraceae suggested.—From auth. summ.

13726. TAYLOR, WM. RANDOLPH. Algae collected by the "Hassler," "Albatross," and Schmitt expeditions. II. Marine algae from Uruguay, Argentina, the Falkland Islands, and the Strait of Magellan. Papers Michigan Acad. Sci., Arts and Lett. 24(1): 127-164. 7 pl. 1938(1939).—Some material collected by G. W. Herter and P. Jordan is also included. About 110 spp. and vars. are treated, with many new station records, especially from the 2 first-named countries, the algal flora of which is nearly unknown. New spp.: in Epymenia (1, Falkland Is.), Rhodymenia (1, Falkland Is.), Callithamnion (1, Uruguay), R. cuneifolia (Phyllophora c. Hooker f. et Harv.). Descriptive notes are given for many species, as well as citations of stations and synonymy. The literature cited includes the chief comprehensive accounts of marine algae from the areas discussed.—W. R. Taylor.

FUNGI

Editor: C. L. SHEAR. Associate Editor: EDITH K. CASH (See also in this issue Entries 13971, 14036, 14037, 14040, 14044, 14049, 14172)

FUNGI

13727. BEATUS, RICHARD. Entwicklungsgeschichtliche und zytologische Untersuchungen an Ascomyceten. 1. Perisporium funiculatum Preuss. Jahrb. wiss. Bot. 87(2/3): 301-323. 1938.—P. funiculatum is haplosynoecious. The antheridia and oogonia are swollen hyphal ends which fuse with one another. After the \mathcal{S} nucleus has passed into the oögonium the sexual nuclei lie close to one another but there is no fusion. As a rule many nuclear and cell divisions follow in the oögonium. Each of these cells contains 2 nuclei. Cell divisions cease but nuclear divisions continue, thus large cells arise, the true ascogonia, which contain up to 8 nuclei. The asci arise either directly from the ascogonium or from binucleate, ascogenous cells which are given off from the ascogonium. The 1st division of the primary ascus nucleus is a reduction division (n=4). Spore membrane arises by condensation from the plasma. Nuclear sizes are: in young mycelium 0.6μ , outer cells of fruit body 1.1μ , paraphysis 1.2μ , and $0.9 \times 1.5\mu$, primary ascus nucleus 2.8μ .—J. H. Priestley.

13728. BJØRNEKAER, K. Undersøgelser over nogle danske Poresvampes Biologi med saerligt Hensyn til deres Sporefaeldning. [Investigations on the biology of some Danish Polyporaceae with special regard to their sporeshedding.] Friesia 2(1): 1-41. 4 fig. 1938.—Collection of spores from living fruit-bodies in natural habitat during 1930-1933 proved the periods of spore ejection in Denmark in the following 8 spp. of Polyporaceae to average as follows: Polyporus fomentarius, April 15-June 15 and Sept. 1-Nov. 1, sometimes with a short activity about the middle of the resting period June 15-Sept. 1; Daedalea quercina, April 15-Nov. 15; Polyporus cupreo-laccatus, May 15-Oct. 15; P. applanatus, June 1-Dec. 1; P. fuliginosus, Nov. 15-March 31; Daedalea gibbosa, April 15-Jan. 31; Polyporus adoratus, April 1-Feb. 15; and P. annosus the whole year. The spores of P. fomentarius ejected in the spring are much larger (20-22 × 6 \(\mu \)) than the autumn spores (14-18 × 4-5 \(\mu \)). At least 2 new tube-layers a year are always formed, in P. fomentarius one during the spore ejection in the spring and one during the autumn ejection, but one or several additional layers are sometimes formed, corresponding to the intermediate spore ejection periods. No safe criterion for the determination of the age of a fruit-body was demonstrated, but in all probability the fruit-bodies hardly

attain an age of 10 years. The under surface of *P. fomentarius* shows by its color whether the fruit-body is in activity or in rest. Rare or new host plants for several Polyporaceae are enumerated.—*K. Bjørnekaer*.

13729. BUCHWALD, N. FABRITIUS. Fungi imperfecti (Deuteromycetes). En Vejledning i studiet af de sekundaere Sporeformer hos Svampene. [A guide in the study of the secondary spore forms in fungi.] 144p. Frontispiece. Den Kongelige Veterinaer- og Landbohøjskole: Copenhagen, 1939.—The main purpose of this book is to provide students of plant pathology with a systematic basis for laboratory exercises. For this reason emphasis is placed on plant pathogenes although consideration is also given to many other species of practical importance in medicine, pharmacy, fermentation and in the manufacture of various foods and textiles. Brief reviews are presented of the more recent systems of classification proposed by J. Schroeter, P. Vuillemin and F. v. Höhnel. The taxonomic treatment is based on the Saccardo system which divides the group into the orders Sphaeropsidales, Melanconiales, and Hyphomycetales. A 4th order, the Torulopsidales, contains the imperfect yeasts and yeast-like fungi and a short appendix deals with Mycelia sterilia. These groups are then keyed down through families, subfamilies and tribes to the genera. Many references from the world literature are given under the various sections and there is appended an annotated list of mycological works useful to the student.—H. N. Hansen.

13730. BURGES, ALAN. Soil fungi and root infection.

13730. BURGES, ALAN. Soil fungi and root infection. A review. Brotéria Ciênc. Nat. 8(2): 64-81. 1939.—Various methods are described for estimating the number of fungi in soil and determining their distribution. The types of soil fungi are classified as (a) root parasites, (b) casual parasites and mycorrhizal fungi, (c) facultative parasites and primary saprophytes, and (d) true soil fungi. Literature cited, p.80-81.—E. K. Cash.

13731. CIFERRI, RAFFAELE. Ritrovamento e cultura dell' Emericella variecolor Berkeley (Eurotiaceae). [Recovery and culture of Emericella variecolor.] Nuovo Gior. Bot. Ital. 45(1): CLIX-CLXXIII. 1 pl., 2 fig. 1938(1939).— This rare fungus, previously identified in Italy as Inzengaea asterosperma, on decaying olives, has been isolated and cultivated. Its conidial stage is referred to Aspergillus stellatus.— F. Ramaley.

13732. DIEHL, WILLIAM W. Identity and parasitism

of a species of Dothichloë. Jour. Agric. Res. 58(12): 947-954. 1 pl. 1939.—D. limitata occurs on Calamagrostis canadensis, C. hyperborea, Chloris petraea, Ctenium aromaticum, Era-grostis capillaris, E. hirsuta, E. refracta, Gymnopogon am-biguus, Panicum agrostoides (and 2 other Panicum spp.), Sporobolus poiretii, and Thrasya petrosa, from N. Dakota to Brazil. Field observations and expts. show that low temps. inhibit fructifications of the fungus and indicate that infection is systemic with resultant sterility of affected grasses, but without obvious lesions or striking abnormal coloration .- W. W. Diehl.

13733. FISHER, EILEEN E. A study of Australian "sooty moulds." Ann. Botany 3(10): 399-426. 1 pl., 4 fig. 1939.—After a critical analysis of previous investigations, the taxonomy of the "sooty mould" fungi is discussed, and a classification proposed by which they are grouped according to the macroscopic appearance of their growth. Diagnostic features of 6 families (Capnodiaceae, Chaetothyriaceae, Microthyriaceae, Trichopeltaceae, Perisporiaceae, and Atichiaceae) are given. The Capnodiaceae v. Höhn, and Chaetothyriaceae Th. are emended, and keys are given for the identification of the genera included in these families. 8 fungi isolated from epiphytic "sooty moulds" have been grown under controlled conditions of temp, and atmospheric humidity. The geographical distribution of epiphytic "sooty moulds" is discussed in relation to the temp. and humidity requirements of the species examined. It is suggested that the scarcity of Capnodiaceae species in cool temperate climates may be correlated with the characteristic deciduous vegetation.—Auth. summ.
13734. FREREJACQUE, M. Note sur l'acide ungulinique,

acide cristallisé isolé de Polyporus (Ungulina) betulinus Fr. Rev. Mycol. [Paris] 3(4/5): 95-98. 1938.

13735. PEYRONEL, BENIAMINO. La forma basidiofora (Helicobasidium purpureum Pat.) della Rhizoctonia violacea in Italia. [The basidium-bearing form of Rhizoctonia violacea in Italy.] Nuovo Gior. Bot. Ital. 46(1): 146-148. 1939. The fruit bodies of *H. purpureum*, hitherto unknown in Italy, were found in the province of Siena. The fungus developed upon roots of *Acer campestre*, *Urtica dioica*,

Rumex obtusifolius, and Convolvulus saepium.—F. Ramaley.
13736. SHEAR, C. L. Mycological notes. III. Mycologia
31(3): 322-336. 1 fig. 1939.—Sphaeria conferta Schw. is a
synonym of Nitschkia euomphala (B. & C.) Ell. & Ev.
Russula lilacipes* desc. from Va.; Sphaerosporium Schw. is a valid genus distinct from Coccospora Wallr. and moreover antedates the latter genus by 2 yrs. Sphaeria gleditschiae Schw. is a synonym of Sphaeropsis malorum Pk. Both spp. of Dryophilum Schw. are insect galls on oak leaves, D. pezizoideum caused by Neuroterus umbilicatus, D. umbo-natum probably by N. saltarius. Eutypa turnerae is a dothideaceous fungus referred to Dothideovalsa as D. turnerae (syn. Eutypa t. Tassi, Epheliopsis t. P. Henn., Bagnisiella eutypoides Ell. & Ev.). Other species of the genus discussed are D. tucumanensis Speg. (type), and D.

diantherae (Lewis) Th. & Syd. (Syn. Bagnisiella d. Lewis, Eutypa d. (Lewis) Petr.).—E. K. Cash.
13737. SPARROW, FREDERICK K. Jr. Unusual chy-

tridiaceous fungi. Papers Michigan Acad. Sci., Arts and Lett. 24(1): 121-126. 2 pl. 1938(1939).—The morphology of Diplophlyctis laevis, Rhizophidium chaetiferum, and R. granulosporum is given. These were all found on spp. of fresh water algae in the vicinity of Ann Arbor, Michigan. The first occurred on dead filaments of Cladophora sp. and is distinct from *D. intestina*, the only other species of the genus having smooth walled rather than spiny resting spores. R. chaetiferum occurred on dead filaments of Cladophora and Oedogonium. It is distinct from other species of the genus in the formation of long branched or unbranched hairs on its sporangia and resting spores. R. granulosporum is of interest chiefly because of the presence of sexuality in the formation of the resting spores. It was found on Tribonema bombycina associated with Polyphagus parasiticus and Chytridium confervae, none of which has heretofore been recorded from N. America.—F. K. Sparrow,

13738. TORO, RAFAEL A. Pugillus fungorum Venezuelensis. Jour. Agric. Univ. Puerto Rico 22(4): 449-454. 1 pl. 1938.—A taxonomic study. Schiffnerula paraparensis, on Bursera tomentosa, and KERNIOMYCES (near Myriangiella), type K. costi, on Costus macrostachys, are descr.—M. T. Cook.

LICHENES

13739. ALLARD, H. A. The aquatic lichen Hydrotheria venosa Russell in Virginia. Claytonia 5(1): 4-5. 1938.—This lichen, found on Devil's Hole Mt., Shenandoah County, has not previously been reported for this State.—R. S. Freer.

13740. CENGIA-SAMBO, MARIA. Casi di parassitismo e di pseudo-parassitismo in Anaptychia leucomelaena var. circinalis Zahl. [Parasitism and pseudo-parasitism in A. l. var. circinalis.] Nuovo Gior. Bot. Ital. 45(1): XLVII-XLIX. 1938(1939).—This foliose lichen of the bark of trees in Ethiopian forests when growing alone attaches itself to the substratum by numerous rhizoids, and fruits abundantly with large apothecia, but when growing with other lichens it may enter into a parasitic relation with them and be quite sterile. At other times the abundant rhizoids may penetrate a part of the lichen's own thallus and thus become a pseudo-parasite.-F. Ramaley.

13741. CENGIA-SAMBO, MARIA. Lichini che intaccano i mosaici fiorentini. [Lichens which damage Florentine mosaics.] Nuovo Gior. Bot. Ital. 46(1): 141-145. 1939.— Marble and alabaster in glass cases at Florence showed stains and incrustations due to certain lichen growths. The algal complement is usually of the Protococcus type but occasionally is one of the Cyanophyceae; the hyphae are always sterile, hence not determinable. Humidity is evidently the chief external factor which favors the develop-

ment of lichens on the stone.-F. Ramaley.

SPERMATOPHYTA

FRANCIS W. PENNELL, Editor

(See also in this issue Entries 12483, 12502, 12507, 12526, 12585, 12597, 13779, 13783, 13788)

MONOCOTYLEDONES

13742. BELVAL, H. A propos des idées de Hutchinson sur les Amaryllidacées. Chimie et classification. Bull. Soc. Bot. France 85(7/8): 486-489. 1938.—A study of the reserve food materials stored by members of the Liliaceae and Amaryllidaceae leads to the conclusion that, chemically, these 2 groups constitute a single large family. This being the case, it seems more reasonable to retain the traditional division of the 2 groups on the basis of the position of the ovary, rather than to accept Hutchinson's recent re-distribution of the genera on the basis of the type of inflorescence. E. L. Core.

13743. CHIOVENDA, EMILIO. La presenza e diffusione della "Setaria geniculata (Lam.) P. B." in Italia. [Presence and spread of S. geniculata in Italy.] Nuovo Gior. Bot. Ital. 45(1): LXXVII-LXXVIII. 1938(1939).—This subtropical and tropical American grass is now established at Marghera, province of Venezia; it has been reported from the vicinity of Genoa under the name S. gracilis. F. Ramaley.

13744. CIFERRI, RAFFAELE, e GUIDO RENZO GIGLIOLI. I cereali dell'Africa Italiana. I. I frumenti dell'Africa Orientale Italiana studiati su materiali originali. ix+298p. Illus. Regio Istituto Agronomico per l'Africa Italiana: Firenze, 1939.—A monograph of the wheats of Ethiopia, both native and introduced, with some references to those of Eritraea and Libya. Seven spp. are recognized in Ethiopia: Triticum dicoccum, T. durum, T. pyramidale, T. turgidum, T. polonicum, T. vulgare, and T. compactum. Each is discussed as to its synonymy, history, morphology, cytology, agricultural importance, geographical distribution, and ecology. In all, 293 vars are described, the inflorescences of many illustrated with half-tones from photographs. The authors submit a 4-page schedule for study of any var. or

sub-var., and a short method of description which results in a "formula" used in the keys. Brief chapters consider: distribution of spp. and vars., common morpho-biologic features of wheats of montane Ethiopia, the Ethiopian high plains as an evolutionary center of the genus Triticum, present and probable future production of wheat in Ethiopia. -At the present time 75% of the wheat produced is from vars. of T. durum.—There is a full index, and a bibliography

of 51 titles.—F. Ramaley.

13745. GOOSSENS, A. P., and J. J. THERON. South African species of Ctenium Panz. S. African Jour. Sci. 35: 259-262. 2 fig. 1939.—The history and nomenclature of Ctenium Panzer are given. All the external features as well as the anatomical features of the leaves of the available S. African material of this genus were studied and described. In S. Africa this genus is represented by a single species of

which the distribution is given.—A. P. Goossens.

13746. LOOMIS, H. F. A new palm from Costa Rica,
Astrocaryum alatum. Jour. Washington Acad. Sci. 29(4): 141-146. 2 fig. 1939.—Astrocaryum alatum (p.142), from Costa Rica, with vernacular name "coquito."—S. F. Blake.

13747. MECENOVIĆ, KARL. Über Poa stiriaca Fritsch et Hayek und andere schmalblätterige Sippen aus der Verwandtschaft von Poa pratensis. Oesterreich. Bot. Zeitschr. 88(2): 81-103. 3 fig. 1939.—The area of Poa stiriaca (Eastern alps, Carpathian mountains, and mountains of the NW. Balkan Peninsula) was mapped from herbarium specimens, and the stations were enumerated, working out its distinctive characters as compared with *P. angustijolia*, frequent in N. and C. Europe and similar to it, but closer allied to *P*. pratensis. In addition to the type of P. angustifolia the author recognizes 3 vars. of it (viz., strigosa, setacea, praesignis) dispersed over the area of the species. These vars. are characterized in the present paper, whereas the formerly described vars. of *P. stiriaca* are not recognized as such.— M. Onno.

13748. MULLER, CORNELIUS H. A new species of Agave from Trans-pecos Texas. Amer. Midland Nat. 21(3):

763-765. 1 fig. 1939.—A. chisosensis.
13749. PONZO, ANTONINO. Osservazioni sulla foglie del genere Alstroemeria. [Observations on the leaves of the genus Alstroemeria.] Nuovo Gior. Bot. Ital. 46(1): 119-125. 12 fig. 1939.—The early leaves of Alstroemeria (Amaryllidaceae) are in pairs with sheaths inclosing the node. Later leaves twist because of asymmetrical growth, and the original distichous phyllotaxy becomes tristichous.— F. Ramaley.

DICOTYLEDONES

13750. ALLARD, H. A. The kidney bean (Phaseolus polystachyus (L.) BSP.). Claytonia 5(2): 17-18. 1938.—The natural habitat of this plant, the wild bean, is described, and effects of cultivation are related. Deep litter makes it perennial in the wild condition, but it does not survive winter in cultivation. Its cotyledons remain underground, contrary to statements regarding the genus in some manuals.

-R. S. Freer.
13751. BLAKE, S. F. Eleven new American Asteraceae.
Jour. Washington Acad. Sci. 28(11): 478-492. 1938.—New spp. are described in Vernonia (1, Mexico), Eupatoriastrum spp. are described in Vernoma (1, Mexico), Eupatomastrum (1, Mexico), Mikania (3 from Ecuador, 1 from Costa Rica), Aplopappus (1 from Texas, and a n. comb. from Sideranthus), Erigeron (1 new form, from Nevada), Desmanthodium (1, Mexico), Clibadium (1, Ecuador), Rumfordia (1, Mexico), Wulfia (1 var., Ecuador), Psacalium (1 n. sp., Mexico, and a n. comb. from Cacalia).—S. F. Blake.

13752. BULLOCK, A. A., and E. A. BRUCE. On the STANDER AND ASSETTION OF STRUCKS INDICATE PROPERTY.

synonymy and distribution of Strychnos innocua Del.

Bull. Miscell. Inform. Kew 1938(1): 45-52. Map. 1938.
13753. BULLOCK, A. A., and C. V. B. MARQUAND.
Callicarpa subpupescens Hook. et Arn. Bull. Miscell. Inform. Kew 1938(9): 399. 1938. 13754. COTTAM, W. P. A new violet from Utah. Bull.

Univ. Utah Biol. Ser. 4(3): 1-8. 1 pl. 1939.—A new species of violet with notes on a new form of Viola beckwithin.

13755 DIELS, L. Botanical results of the Archbold Expeditions; New Guinea records of Annonaceae and Menispermaceae. Jour. Arnold Arboretum 20(1): 73-74. 1939.—Three Menispermaceae and 4 Annonaceae are enumerated; among the latter there is a new sp. of Orophea and a new comb. in Rauwenhoffia.—A. Rehder.

13756. DYER, R. A. Euphorbia fasciculata Thunb. and E. schoenlandii Pax. S. African Jour. Sci. 35: 298-299, 2 pl. 1939.—Brown, in Thiselton-Dyer Fl. Cap. Vol. 5 pt. 2, pp.339-340, considered E. fasciculata Thunb. and E. schoenlandii to represent one species but the names actually refer

to 2 distinct species.—R. A. Dyer.
13757. EGLER, FRANK E. Santalum ellipticum, a restatement of Gaudichaud's species. Bernice P. Bishop Mus. Occas. Papers 14(21): 349-357. 1939.—S. ellipticum, a lowland sandalwood of the Hawaiian islands, is redefined as a single species, exhibiting phenotypic epharmosis and normal variation in flower length. It occurs on Laysan, Oahu, Molokai, Lanai, Maui, Kahoolawe, and Hawaii. S. ellipticum var. littorale, S. cuneatum, S. cuneatum f. gracilius, and

S. cuneatum var. laysanicum are reduced to synonyms of S. ellipticum.—E. H. Bryan, Jr. (from auth. summ.). 13758. HITCHCOCK, C. LEO. The perennial Mexican Namas. Amer. Jour. Bot. 26(5): 341-347. 9 fig. 1939.—A monographic account of the perennial Mexican spp. of the section Eunama. Three spp. and a var. are described, and other nomenclatorial changes are made.—C. L. Hitchcock.

13759. NILSSON, H. Anagallis arvensis L. s.l. und die Natur ihrer Farbenvarianten. Hereditas 24(1/2): 97-109.

1938.

13760. ROLLINS, REED C. Studies in the genus Lesquerella. Amer. Jour. Bot. 26(6): 419-421. 1 fig. 1939.— The following chromosome numbers were presented for 6 spp. and 1 var. of Lesquerella, based on 11 samples of material gathered from naturally occurring plants in Colorado and Wyoming: L. alpina, L. montana, L. montana var. suffrutescens, and L. ludoviciana, n=5; L. fendleri, n=6; L. intermedia, n=8; L. calcicola 2n=ca.20. The cultivation of 5 spp. and 1 var. of Lesquerella under ordinary greenhouse conditions failed to change the abundance or disposition of their stellate indumentum. L. calcicola and L. subumbellata from Colorado and Utah, and L. arctica var. scammanae from Alaska, are described as new.—R. C.

13761. SWINGLE, WALTER T. Clymenia and Burkillanthus, new genera, also three new species of Pleiospermium (Rutaceae-Aurantioideae). Jour. Arnold Arboretum 20(2): 250-263. 3 pl. 1939.—CLYMENIA from the Bismarck Archipelago and BURKILLANTHUS from Malaysia are described as new genera, based on previously published species of Citrus, and 3 new spp. of Pleiospermium

from Borneo and Sumatra are descr. Illustrations of the new genera and species are given.—A. Rehder.

13762. VIGNOLO-LUTATI, FERDINANDO. Sulla sistematica di alcune Ambrosiae. [Taxonomy of certain ambrosias.] Nuovo Gior. Bot. Ital. 46(1): 71-87. 1 pl. 1939.— Ambrosia elatior L. and A. artemisiifolia L. are both valid species; so also are A. psilostachya DC. and A. coronopijolia T. and G. (=A. psilostachya A. Gray, not DC.). Plants of the 1st group, in Italy, and probably all those introduced in the rest of Europe, should be referred to A. elatior L.; those of the 2d group thus far collected in Italy are all A. coronopifolia T. and G. It is probable that the true A. psilostachya of deCandolle also occurs in Italy.—F. Ramaley.

FLORISTICS AND PLANT DISTRIBUTION

13763. ALLARD, H. A. Grass and carices new to Virginia. Claytonia 5(2): 15-16. 1938.—Apparent first records for Virginia are given for Bouteloua curtipendula and Carex

virginia are given for Boutetoua curtificational and Carex angustior, C. rugosperma, and C. bushii.—R. S. Freer. 13764. CHIOVENDA, EMILIO. Intorno all' indigenato della "Periploca graeca L." in Italia. [Indigeneity of P. graeca in Italy.] Nuovo Gior. Bot. Ital. 45(1): XXVI-XXXV. 1938(1939).—This plant of the eastern Mediterranean region, a member of the Apocynaceae, has long been of interest as to its original geographic range, having been credited as a member of the flora of Tuscany as early as 1798, but later believed to have been introduced. Recently, from paleontological and ecological considerations it has been considered a relict species, but now from the study of the literature and examination of many herbaria it seems certain that the plant was introduced by Ghini in 1547 at the botanic garden of Pisa; it is now fully naturalized in the Tuscan littoral.—F. Ramaley.

13765. COMAN, ARTUR. Contribuțiuni la flora Mara-

mureșului. [Flora of Maramures.] Rev. Pădurilor [Bucharest] 51(5): 378-381. 1939.—Notes on the occurrence in No. Rumania of Juncus tenuis, Nasturtium officinale, Lotus corniculatus v. alpestris, L. tenuifolius, Althaea officinalis, Malva moschata, Swertia perennis, Scopolia carniolica, Euphrasia tatrae, Stenactis ramosa, Ambrosia artemisifolia, Xanthium brasilicum, Chrysanthemum leucanthemum v. silvestre, Senecio carniolicus, S. glaberrimus, Arctium tomentosum, and Leontodon hispidus v. carnicus.—W. N. Sparhawk.

13766. FENAROLI, LUIGI. Saggio su la distribuzione delle selve castanili nella Montagna Lombarda. [Distribution of chestnut forests in the mountains of Lombardy.] Riv. Forest. Ital. 1(3): 24-30. Map, 3 fig. 1939.—The distrib. of all areas of chestnut high-forest (not including coppice or mixed forest containing chestnut) in No. Lombardy and the Swiss cantons of Tessin (Ticino) and Grisons (Grigioni) is shown on a map. These forests are between 200 and 1,000 m. altitude, in the foothills and mountains. At lower altitudes the best stands are on N. slopes; at higher altitudes, on S. slopes.—W. N. Sparhawk.

altitudes, on S. slopes.—W. N. Sparhawk.

13767. GIORDANO, GUGLIELMO. Cenni monografici sulle piante forestali e sui legnami dell' A.O.I. [Forest plants of Italian East Africa and their woods.] Riv. Forest. Ital. 1(3): 41-46. 8 fig. 1939.—The plants and woody structure of Myrica salicifolia, Celtis kraussiana, and Morus mesozygia are descr., with notes on their distrib.—W. N.

Sparhawk.

13768. GUILLAUMIN, A. A florula of the island of Espiritu Santo, one of the New Hebrides. Jour. Linn. Soc. [London] Bot. 51(340): 547-566. 1938.—The flora of the island was previously almost unknown (only 40 spp. cited). Collections by Miss Ina Baker and Mrs. Zita Baker in 1933-1934 brought the number of spp. to 250. New spp. are descr. in Dysoxylum (1), Vavaea (1), Tieghemopanax (2), Boerlagiodendron (1), Parsonia (1), Tylophora (1) and Claoxylon (1).—A. Gwillaumin.

13769. HARA, HIROSHI. Preliminary report on the flora of southern Hidaka, Hokkaido (Yezo). XXXVI. Bot. Mag. [Tokyo] 53(625): 17-22. 1939.—A summary with an index of genera in this enumeration of 823 species including 14 endemics of Mt. Apoi and 11 of the adjacent area. The richness of the flora on this mountain is due to its ancient geological formation and proximity to the sea. Northern and southern elements are close together and alpine plants occur at low altitudes. Adjacent mountains, although higher, have less rich floras. Data are given comparing this flora as a whole with that of other regions around the northern Pacific. Northern elements greatly exceed southern. The affinity with Korea is greater than with nearer regions. Abstracted in Japanese, p.45.—E. H. Walker.

Abstracted in Japanese, p.45.—E. H. Walker.

13770. HARALAMB, AT. Pin silvestru spontan in împrejurimile Curții de Arges. [P. silvestris in the vicinity of Curtea de Arges.] Rev. Pădurilor [Bucharest] 51(3/4): 260-267. Map, 5 fig. 1939.—Spontaneous growth of P. silvestris is reported at 2 new stations in the valley of Arges, Rumania.—W. N. Sparhawk.

13771. LEWIS, J. B. New stations for Phlox glaberrima

var. melampyifolia in Amelia county, Virginia. Claytonia 5(1): 5. 1938.—Two new stations are described for this rare Phlox, discovered by John Clayton about 200 years ago.—R. S. Freer.

13772. LUPE, I. O staţiune de tisă (Taxus baccata L.) in Munții Gurghiului. [A station for yew in the Gurghiu Mountains, Rumania.] Rev. Pădurilor [Bucharest] 51(3/4): 268-273. Map, 1 fig. 1939.—37 yew trees, the dimensions of which are given, occur at this site.—W. N. Sparhawk. 13773. LUZZATTO, GINA. Erborizzazioni a Fiuggi nel'

Agosto, 1937. [Plant collections at Fiuggi in August, 1937.] Nuovo Gior. Bot. Ital. 45(1): CXXXVIII-CXLVII. 1938 (1939).—A list of 290 spp. of seed plants collected during 17 days in August in the vicinity of Fiuggi, province of Lazio (Latium), some 20 or 30 miles to the east of Rome, in the mountains. The lists are arranged in large part according to altitudes, habitats, and communities.—F. Ramaley.

13774. MEYER, TEODORO. Breves observaciones sobre

13774. MEYER, TEODORO. Breves observaciones sobre la vegetación de los inmediaciones de la estación Pampa de los Guanacos (Santiago del Estero). [Vegetation of Santiago del Estero (Argentina).] Maderil [Buenos Aires] 11(129): 9-12.9 fig. 1939.—Deals especially with forest vegetation.—W. N. Sparhawk.

tation.—W. N. Sparhawk.

13775. PAMPANINI, R. Le erborizzazioni della C. ssa Onorina Bargagli-Petrucci in Libia nel 1937. [Plant collections of the Countess Onorina Bargagli-Petrucci in Libya in 1937.] Nuovo Gior. Bot. Ital. 45(1): CXLIX-CL. 1938 (1939).—A list, with localities, of 265 spp. of seed plants, 96 being hitherto unreported from this coastal area of Libya from Tripoli east to Derna.—F. Ramaley.

13776. PORSILD, A. E. Flora of Little Diomede Island in Bering Strait. Trans. Roy. Soc. Canada Sect. 5 32: 21-38. 1938.—A brief account is given of the physiography, fauna and flora of this small, 1300 ft. high granite island, which the author believes was never glaciated. The flora is arctic but, although presumably very old, is surprisingly poor in species and, although more closely related to that of the Asiatic side, all species recorded are common to both sides of Bering Strait. Of the total of 76 species 38 are circumpolar, arctic-boreal; 3 are Am. plants having a limited distribution in E. As.; 20 are arctic-boreal having a chief distribution in Eurasia while 15 are endemics of the Bering Sea region. The absence of several spp. common to both shores of Bering Strait is noted and also the entire absence of spp. in Polypodiaceae, Equisctaceae, Liliaceae, Leguminosae, Onagraceae, Umbelliferae, Gentianaceae and Scrophulariaceae and also of introduced spp. An annotated list with critical notes is given. Aconitum delphinifolium var. albiflorum and Cardamine bellidifolia var. beringensis are descr.—A. E. Porsild.

13777. SRIVASTAVA, G. D. Flora of Allahabad. Allahabad Univ. Stud. Bot. Sect. 1938: 51-127. 1938.—A check list.

13778. STEHLE, H. Notes sur la répartition et l'écologie de Dicotylédones nouvelles ou rares de la Martinique. 5. Bull. Soc. Bot. France 85(7/8): 575-579. 1938.—An annotated list of 14 spp. and vars. of Loranthaceae, Piperaceae, Bixaceae, and Compositae.—E. L. Core.

MORPHOLOGY AND ANATOMY OF VASCULAR PLANTS

ADRIANCE S. FOSTER, Editor

(See also in this issue Entries 12510, 12528, 12534, 12584, 12831, 13943, 13984)

13779. ARBER, AGNES. Studies in flower structure. V. On the interpretation of the petal and "corona" in Lychnis. Ann. Botany 3(10): 337-346. 5 fig. 1939.—The 2 coronal teeth of the petal are not ligular or stipular, neither are they enations; they are hollow lateral invaginations corresponding in general structural type to the single median tooth in the Boraginoideae. Evidence is tendered that is held to disprove Mattfeld's theory (1938) that the petal in the Caryophyllaceae represents fused stipular outgrowths from the superposed stamen. The spatial relation of floral whorls is possibly due to mechanical causes, and hence the "problem" of obdiplostemony is, for the morphologist, an imaginary one.—From auth. summ.

13780. BODE, H. R. Über unechte "intracelluläre Stabbildungen in secundären Zuchwachszonen einiger Pflanzen. Gartenbauwiss. 12(4/5): 399-405.6 fig. 1939.—Differentiating between true trabeculae of rod-like structures formed across the lumen (by anomalous behavior of the plasma) and "false bars," the author shows that structures which can hardly be distinguished from true bars are often due to penetration of foreign bodies. Instances are given where punctures and secretion by Pseudococcus citri (Citrus Mealybug) have produced intracellular structures which appear very much like true trabeculae.—K. D. Brase.

like true trabeculae.—K. D. Brase.

13781. CHIARUGI, ALBERTO. Un particolare tipo di
pneumatodi sulle drupe di Erythea edulis S. Vatson [sic!].

[An unusual type of pneumathode in the fruit of E. edulis S. Wats.] Nuovo Gior. Bot. Ital. 45(1): CXXIV-CXXXII. 1 pl. 1938(1939).—The drupe of this Mexican palm when almost mature but still olive green bears on its surface numerous pale punctiform areas which, under the microscope, are seen to be structures for aeration. The external opening is about 100 μ across and leads to a deep cavity enlarged below and with extensive branches penetrating the fleshy mesocarp. Early development shows 2 large guard cells, but in older fruits these become displaced so that the sub-stomatal origin of the pneumathode is no longer apparent. There is no phellogen or other meristem involved in the formation of the pneumathode, hence it is in no respect a lenticel; furthermore the long canals of the pneumathode are sui generis in morphology. Evidently these pneumathodes serve for respiration and photosynthesis.—
F. Ramaley.

13782. DEBENHAM, E. M. A modified technique for the microscopic examination of the xylem of whole plants or plant organs. Ann. Botany 3(10): 369-373. 1 pl. 1939.— A modification of a clearing technique for uncut material is described together with the subsequent staining and permanent mounting. The object of such treatment is the elucidation of the course and structure of the xylem in whole plants or plant organs. The method has been successfully employed with a variety of vascular plants. It involves (1) clearing in 70-75% lactic acid at 58-60° C; (2) bleaching in Eau de Javelle at 40° C; (3) staining the xylem with ammoniacal fucksin; (4) mounting in euparol or Canada balsam.—Auth. summ.

13783. FASOLO, UGO. Sul possibile valore sistematico del minimo lume vasale nei legni di Angiospermae. [Possible taxonomic value of minimal vessel size in Angiosperms.] Nuovo Gior. Bot. Ital. 45(1): CXCVI-CCI. 2 fig. 1938 (1939).—Examination of cross sections of mature xylem shows that the lumen diameter of the smallest vessels is remarkably constant for any species, ranging from 9 and 10 \(\mu\) for Arbutus unedo and Buxus sempervirens to 40 and 45 \(\mu\) for Ficus sycomorus and F. vasta, with the most common diam. for all the 73 spp. of trees and shrubs examined found to be 13 \(\mu\).—F. Ramaley.

13784. HOLLOWAY, JOHN E. The gametophyte, embryo, and young rhizome of Psilotum triquetrum Swartz. Ann. Botany 3(10): 313-336. 2 pl., 67 fig. 1939.—The gametophyte of P. t. occurs in the volcanic soil of Rangitoto Island, Auckland, New Zealand. The largest gametophytes contain a conducting strand having annular and scalariform tracheids and a limiting endodermis; a description is given of the apical origin of this strand, its discontinuous character, and the structure of its tissues. It is considered as due either to some abnormal nuclear condition in such gametophytes, or to physiological changes taking place in the gametophyte as it grows in size, or to the persistence in it of an archaic feature. Several stages in the development of the embryo are descr.; the Psilotum embryo corresponds in all structural details with that of Tmesipteris. The further growth of the embryonic shoot from one or more apices is descr., and also its detachment from the foot. Similarities and differences are noted between young gametophytes of gemma origin, young rhizomes of gemma origin, and young sporeling rhizomes. The similarity of the Psilotum embryo and sporeling rhizome to that of Tmesipteris suggests that the absence of root and cotyledon is an archaic feature.—From cuth. summ.

13785. JACCARD, P. Harzgänge und mechanische Eigenschaften des Holzes. Schweiz. Zeitschr. Forstw. 90(4): 122-126. 2 fig. 1939.—The number, distrib., and volume of vertical and radial resin ducts in wood from 4 larch trees (89-220 yrs. old) were investigated. The number and distrib. were irregular. On the ave., there were 3 times as many radial as vertical ducts. Generally there was about 1 radial duct to 35-40 medullary rays. The younger, inner annual rings (i.e., those laid down earlier in the life of the tree) had more ducts per unit of section than older, outer rings. Number of ducts varies more or less with rapidity of

cambial growth. The ducts, which occupy scarcely 0.1% of the stem volume, have no significant influence on the technical properties of the wood. Figures are presented showing a clear relation of strength and specific wt. of various woods to the proportion of cross-section occupied by fiber walls.—W. N. Sparhawk.

13786. KRISHNA IYENGAR, C. V. Development of the embryo-sac and endosperm-haustoria in some members of Scrophularineae. Jour. Indian Bot. Soc. 18(1): 13-20, 1939. A thick integument and reduced nucellus are present in the ovules of Celsia and Isoplexis. The integument and the placenta are filled with oil globules. The narrow end of the 8-nucleate embryo-sac is surrounded by the integumentary tapetum. The chalaza is conspicuous by the presence of a tissue composed of radiating cells with rich contents. In both forms the endosperm is cellular, and the embryo is of the normal dicotyledonous type. The early formation of 4 simple uninucleate chalazal haustoria and the belated development of the 4 uninucleate micropylar haustoria from the endosperm are also common to both members. The micropylar haustoria in Celsia are reduced in size; in Isoplexis they are bulbous towards the micropyle and funnel-like towards the endosperm. The nuclei of the older haustoria are hypertrophied and amoeboid. In Celsia some of the tapetal cells enlarge conspicuously, and probably assist in the digestion and absorption of the tissue-contents of the integument.—C. V. Krishna Iyengar.

13787. SCARAMELLA, PIERA PETRA. Anatomia dell' "Hylocereus undatus (Haworth) Bullon & Rose." [Anatomy of H. undatus.] Nuovo Gior. Bot. Ital. 45(1): LXXI-LXXVII. 8 fig. 1938(1939).—This member of the Cactaceae produces aerial roots which, when young, have a large parenchymatous pith and thick cortex of delicate parenchyma, but early wall-thickening of pith cells occurs, and a heavy sheath of sclerenchyma soon surrounds the vascular cylinder. Medullary rays in the stem are lignified but at the twists of the stem there is a "delignification" and return to the parenchymatous condition.—F. Ramaley.

13788. VIGODSKY-de PHILLIPS, AVIGAII. Studio morfologico ed anatomico di "Leiphaimos brachyloba (Griseb.) Urb. var. cumbrensis Urb. and Ekm." [Morphologic and anatomic study of L. b. var. cumbrensis.] Nuovo Gior. Bot. Ital. 45(1): CXC-CXCV. 8 fig. 1938(1939).—This saprophyte of the Gentianaceae collected in the mts. of Haiti, has a slender whitish stem 10-14 cm. tall, the leaves reduced to scales, nodes distant, a single blue-violet flower. Roots are short (8-10 mm.) and stumpy, with mycorrhiza. In all parts of the plant vascular tissue is greatly reduced, strengthening tissue is absent, epidermis is thin-walled with scattered mucilage cells. The 2 gametophyte has the spherical synergids close to the egg, and near to this is the large endosperm nucleus; the 3 antipodals are small.—F. Ramaley.

13789. VOSS, W., R. BAÜR, und J. PFIRSCHKE. Über den Aufbau von jungen hochverholzten Zellwänden. 1. Über Studien zum Verholzungsproblem. Justus Liebig's Ann. Chem. 534(2/3): 95-135. 8 fig. 1938.—The previous studies of lignified cell walls have been done with trunk wood and have therefore encountered certain difficulties: the cells are of different ages and differ in form and function, and lignification is slight. The present research therefore deals with the stones of plums, cherries and walnuts which do not offer the above mentioned variables.—The contents of cellulose and xylan in these can be expressed by a simple whole-number relation: for Californian plums, 3:1; for German plums, 2:1. The weather had no influence upon this relation. Independent of the still unsolved question of the length of the chain or the degree of polymerization of cellulose, the individual cellulose-chains are combined in the solid state to bundles or micelles. Xylan-containing cellulose prepns. show a blurred X-ray picture of the cellulose, the picture becoming sharper after the xylan is removed. Since the remaining cellulose prepns. can be assorted after the removal of the xylan into types of the quotients 2:1 and 3:1, it is assumed that the xylan covers the cellulose bundles like a shell.—M. Neuhof.

AGRONOMY

Editor: CARLETON R. BALL. Associate Editors: M. A. McCALL, Crops; R. B. DEEMER, Soils

(See also in this issue Entries 12520, 12524, 12527, 12530, 12532, 12533, 12539, 12562, 12583, 12591, 12602, 13350, 13351, 13744, 13866, 13888, 13902, 13903, 13977, 13979, 13980, 13986, 13996, 13998, 13999, 14001, 14004, 14023, 14024, 14026, 14076, 14088)

CROP SCIENCE (ARVICULTURE)

13790. ALBRECHT, W. A., ELLIS R. GRAHAM, and CARL E. FERGUSON. Plant growth and the breakdown of inorganic soil colloids. Soil Sci. 47(6): 455-458. 1939.— A balance sheet of the movements by both the exchangeable and the nonexchangeable cations of colloidal clay as detd. by complete analyses of the soybean seed and colloidal clay at the outset and of the crop at the close of the expt. shows that the clay was broken down by plant growth. This released the nonexchangeable Si, Fe, and Al to the extent of 2 or 3% of the totals in the clay. Clay treatment by CO2 failed to release these in significant amts. Such clay breakdown is insignificant as a means of releasing nutrients

other than possibly Fe.—W. A. Albrecht.

13791. ANDERSON, W. S. The influence of nitrogen on grade and shape of triumph sweet potatoes in Mississippi. Proc. Amer. Soc. Hort. Sci. 36: 605-608. 1938(1939).—The proportion of N in a complete fertilizer containing 8% P and 4% potash was varied by increments of 2% from 2% to 8% on Ruston, Orangeburg, and Cahaba soils. The Triumph var. was planted, and plots of .0072 acres each were replicated at least 4 times. Data were obtained each year from 1935 to 1938 inclusive on the influence of the N upon yield and proportion of the grades Jumbo, U.S. No. 1, U.S. No. 2, and culls. (Culls included the roots from 4 inch to 1½ inch.) Data were also obtained on influence of N upon the shape of the roots of the No. 1 grade. Varying the N under the conditions of these expts. did not influence the proportion of the various grades nor the shape of the roots of the No. 1 grade significantly. The more firm and moisture retentive Orangeburg soil produced a greater proportion of Jumbo size roots and more chunky roots than the other 2 rather sandy soil types; the Cahaba, a sandy soil, produced a more slender root than the other soils.—W. S. Anderson.

13792. ARMSTRONG, S. F. Trials of autumn-sown wheats, 1931-1937. Jour. Nation. Inst. Agric. Bot. 4(3): 238-265. 1938.—A report is given of the trials of autumnsown wheat vars. in 6 years. Starling II, Sun III, Victor, Brown's B.03561, Brown's 15/100, Renown, Gartons' 60, Steel, Juliana, Redman, and the Cambridge P.B.I. Wheats Rivett 25, Holdfast, 162/8/1E, 162/55/1 and W.70E are reviewed individually. Of the white-grained wheats Wilhelmina and Juliana are rated of high quality with Victor equally good. Although Starling II gives the highest yield it can not be recommended, because of its poorer quality. Of the red grained vars. Squarehead's Master is not excelled in yield by Sun III, Brown's B.03561, Steel, or any others. A great deal of information about soils, manures, and

A great deal of information about soils, manures, and previous cropping, as well as tabular data of the result of the trials, are given.—H. Dorsey.

13793. AXTMAYER, JOSEPH H., G. RIVERA-HERNÁN-DEZ, and D. H. COOK. The nutritive values of some forage crops of Puerto Rico. II. Legumes, grasses and a mixture. Jour. Agric. Univ. Puerto Rico 22(4): 455-481. 1938.—A study of the biological values of the proteins of legumes. 15 tables of valuable data are included.—M. T. Cook

13794. BLAIR, A. W., and A. L. PRINCE. Studies on the nitrogen, phosphorus, and mineral requirements of alfalfa. Soil Sci. 47(6): 459-466. 1939.—Alfalfa was grown on Sassafras loam from 1935 to 1938, inclusive. The land had been in potatoes for 10 yrs, and in wheat for 1 yr., previous to seeding the alfalfa. The check plots received no P during the entire period (1924-1938). Other plots received varying amts. of P annually, in the form of superphosphate. No N was applied for the alfalfa except a light application at the time of seeding. K2O was applied uniformly to all plots, annually. The 4-yr. average gave essentially the same yields of hay for the check plots as for those that received the highest application of P. There was some tendency toward a higher percentage of P in the hay with

the increase of P fertilizer. The percentages of N, ash, CaO, and MgO were not significantly influenced by the amt. of P applied. Analysis of the soil showed a slight, gradual increase in the percentage of P2O5 from the lowest application of phosphate to the highest. As an explanation for the failure to get a response from the P applied, it is suggested that the great reservoir of total P in the soil, to the depth penetrated by the alfalfa roots, may furnish enough available P for maximum crop growth (alfalfa). The results reported are for the conditions under which this expt. was conducted and are not to be taken as an endorsement of a policy of omitting P from alfalfa fertilizers.-A. W. Blair.

13795. BOERGER, A. Die Entwicklung des uruguayischen Leinbaues unter dem Einfluss von Forschung und Züchtung. Faserforschung 13(4): 185-213. Illus. 1938.

13796. BOLIN, DONALD W., and ASSAD M. KHALA-PUR. A precise method for the determination of carotene in forage. Industr. and Engineer. Chem. 10(8): 417-418. 1938.—Peterson and Hughes' modification of Guilbert's method for extracting carotene from forage has been further modified by the authors to permit the use of definite quantities of reagents and to avoid the formation of emulsions. More carotene is recovered by the modified method and more precise results obtained.—B. H. W. (courtesy Jour. Dairy Sci.).

13797. BOLSUNOV, I. I. Tzennii Hibrid Makhorki. lischenii Sozvetii i Verkhnikh Passynkov. [A valuable hybrid of Nicotiana (Nicotiana rustica) without flowers and upper suckers.] Selektzia i Semenovodstvo [Plant Breeding and Seed Growing] 9(2/3): 40-41. 1939.—The development of a non-blooming hybrid without upper suckers or small leaves is descr. and illustrated.—J. W. Pincus.

13798. BRANDRETH, B. County winter oat trials, 1935-36 and 1935-37. Jour. Nation. Inst. Agric. Bot. 4(3): 235-237. 1938.—The oat vars., Resistance, S.81 and Grey Winter, were tested in 14 trials in 12 counties in England in the season, 1935-36, and in 8 trials in 8 counties in 1936-37. There were also a number of observation plots each year in addition. Grey Winter was outyielded by the other vars. and lodged more than they. Resistance was less suited to cold, wet, spring weather than the others and under such conditions was outyielded by S.81 as a rule. Where fertility was high Resistance outvielded.—H. Dorsey.

13799. BRANDRETH, B., and J. W. DALLAS. Bedfordshire potato trials, 1936-37. Jour. Nation. Inst. Agric. Bot. 4(3): 304-306. 1938.—Four vars. of potatoes were compared on 2 soils for use as first early crop vars.—3 in 1936-37 and a 4th at one center in 1937. Ninetyfold was superior and Arran Pilot next, with Epicure lowest. Doon Early was promising but is not yet recommended .- H. Dorsey.

13800. BRYAN, H. Lord Derby gold medal trials, 1937. Jowr. Nation. Inst. Agric. Bot. 4(3): 298-299. 1938.—Trials of 2 vars. of potatoes, Dunbar Rover, and Dunbar Archer, for the gold medal are reported and on the basis of the outcome, the 1st received the award and the 2d was given the privilege of a 2d trial the following year. Careful descriptions of the 2 vars. are included.—H. Dorsey.

13801. BRYAN, H. Potato trials, Ormskirk, 1937. Jour. Nation. Inst. Agric. Bot. 4(3): 300-303. 1938.—Four sets of varietal comparisons of potatoes are reported. Arran Pilot in the 1st was superior to Ninetyfold, Duke of York and Sharpe's Express for early production. In the 2d, Doon Early was superior to Epicure and in the 3d, Kerr's Pink was superior to Redskin for the main crop. In the 4th trial, Majestic seed stock from several centers was compared in a trial at Ormskirk. Aberdeenshire stock outyielded all with Ross-shire coming near it.—H. Dorsey.

13802. BURD, JOHN S., and H. F. MURPHY. The use of chemical data in the prognosis of phosphate deficiency in soils. *Hilgardia* 12(5): 323-340. 1939.—Based on previous

work and data from special expts., this paper discusses acid extraction of soils as criteria of what actually happens at the interphase between root hair and soil particle. Extractions in vitro represent reactions between the reagent and the entire soil and secondary reactions conceal the effects of reaction upon individual particles. The particular contri-bution of the paper is an analysis of the effect of phosphate adsorbing clay bodies upon the effects of acid extraction, and the interpretation of the latter in the light of determinable data of the adsorbing properties of individual soils. Acid extractions so interpreted, together with data as to the adsorbed phosphate and the adsorbing capacities of a group of 14 soils, explain why individual soils respond or fail to respond to phosphate fertilizers.—J. S. Burd.

13803. CHUCKA, JOS. A., and B. E. BROWN. Magnesium studies with the potato. Amer. Potato Jour. 15(11): 301-312. 1938.—Potato fertilizers with and without added Mg were compared on several farms from 1930-1937. Varying amounts of Mg were added from such materials as Epsom salts, Kieserite, double sulfate of potash-magnesia and dolomitic limestone. 25 lbs. of MgO, preferably from water soluble sources, per acre can be profitably used in potato fertilizers in Aroostook County, Maine. Material increases in yield of potatoes were secured by the use of Mg

side dressings or sprays on potato plants which had developed Mg-deficiency symptoms.—J. A. Chucka.

13804. CRAFTS, A. S. Toxicity studies with sodium chlorate in eighty California soils. Hilgardia 12(3): 231-247.

3 fig. 1939.—Successful use of NaClO₃ in weed control requires a knowledge of soil factors affecting toxicity. Tests on 80 California soils indicate that fertility or crop-producing power is the predominant factor in determining toxicity. Toxicity was low in fertile soils and high in those producing small crops. Repeated cropping resulted in continued loss of toxicity. Factors related to textural grade and not to fertility evidently controlled toxicity loss. Low toxicity in soils from arid regions was related to total salt content. A schedule of dosages ranging from 1 to 8 lbs. per sq. rod A schedule of dosages ranging from 1 to 8 lbs. per sq. rod is recommended for treatment of susceptible species in California. Dosages within the range depend upon soil fertility. When dosage is above 8 lbs. per sq. rod the cost approaches that of CS₂ and considering possible residual effects on the soil, the latter chemical is recommended under these conditions.—A. S. Crafts.

13805. DODDS, H. H. Science in a primary food industry. The production of sugar. S. African Jour. Sci. 35: 33-51. 1939.—In the earliest days of sugarcane agriculture, the verse cultivated were mainly of 2 types viz the thin

he vars. cultivated were mainly of 2 types, viz., the thin Indian canes (Saccharum barber) and the thicker (S. officinarum). These vars. have been introduced from one country to another by means of cuttings. Since the discovery that sugarcane seed was fertile, systematic breeding com-menced. Use of S. spontaneum to confer resistance to drought and disease has produced vars. of excellent agric, and manufacturing qualities. Intergeneric crosses have recently been effected with Sorghum durra, and Bambusa undinacea, in India, and with Erianthus sp. in Java. The manufacturing of sugar in the mill is controlled throughout by the application of scientific principles. The chief constituents of the cane are the sucrose, which ranges from 12% to 18%, and the fiber, or insoluble matter. The latter, when extracted, passes out of the milling system with a sagar content of about 2%, into the furnaces. During purireason of the juice the by-product known as filter press take is obtained. This is rich in organic matter, P, and line, and is a valuable fertilizer. The filtered juices, trapporated under reduced pressure. vaporated under reduced pressure, provide the syrup which s then boiled under vacuum to produce crystals, which are entrifuged from the molasses. The latter is returned to eil 2-3 times until no more sugar can be profitably reovered. By means of redissolving the crystals and treating with decolorizing agents the final product is obtained.—H. H. 20dds.

13806. DODONOVA, E. V., i N. P. IVANOV. Izutchenie okhemitchekikh Priznakov Yarovykh i Ozymykh schenitz. [The study of bio-chemical characteristics of ting and winter wheats.] Selektria i Semenovodstvo. tant Breeding and Seed Growing 9(2/3): 16-21. 1939.—etermining whether the seeds are of winter or spring vars. is difficult. Attempts have been made to use biochemical tests. The determination of the percentage of "bios" in the cells of plants gave some interesting results; another enzyme, dehydrogenase, also was tried. The greater permeability of the plasm of the young sprouts offers the best indication—not always definite—of whether the wheat is winter or spring.—J. W. Pincus.

13807. DOWN, E. E., and J. W. THAYER, Jr. The Michelite bean. Michigan Agric. Exp. Sta. Spec. Bull. 295. 1-23. 6 fig. 1938.—Michelite, a new white navy bean first released for commercial production in 1937, was derived from a cross between Early Prolific, an excellent white bean, and the productive disease-resistant Robust white navy bean. The Michelite bean combines the resistance to mosaic and to field infection of bacterial blight or wilt and vigorous productivity of Robust and the uniformity in size and shape and glossy white seed coat of Early Prolific. It blooms 2-4 days earlier, but often ripens no earlier than Robust. Michelite generally has a lower percentage of culls and yields as well as Robust and is superior in quality and appearance. The development of Michelite; its resistance to bean mosaic, blight, and wilt; percentage of culls; and comparative yields in station and over-State tests

are described.—Courtesy Exp. Sta. Rec.

13808. FISHER, E. A. The quality for breadmaking purposes of wheats harvested in 1937. Jour. Nation. Inst. Agric. Bot. 4(3): 266-274. 1938.—Six vars. of wheat were grown under intensive and normal manuring with seed from grown under intensive and normal manuring with seed from Cambridge, Cannington, Newport, Long Sutton and Askham Bryan (Yorks.) in mixture, while 5 vars. not of mixed seed were grown in the Fens and 2 from strip trials of the same mixture as named. There was also one observation set of plots. All of these were used to study quality for breadmaking. One wheat, Holdfast, exhibited remarkably good strength, equal to commercial bakers' flours of London although it was grown in the Fens. 3 other wheats were of good quality for making general baking flours. were of good quality for making general baking flours. The remainder of the wheat flours showed a gradual fall in quality. Intensive manuring gave no better quality than normal manuring although the protein was higher in content. Other analytical factors were unaffected by manuring. -H. Dorsey

13809. GORDON, AARON, and ARTHUR W. SAMPSON. Composition of common California foothill plants as a factor in range management. California Agric. Exp. Sta. Bull. 627, 1-95. Frontispiece, 5 fig. 1939.—Foothill range plants were studied with special reference to seasonal march in chemical composition at specific growth stages. The most rapid changes in constituents took place between early leaf development and full bloom. Seasonal variation in the levels of the various constituents was found to be greater within a species than between groups of species of the same life-form. In most of the graminaceous, grasslike, and broad-leaved herbaceous species there was a continuous and rather orderly decline in crude protein, silica-free ash, Ca, P, and K, and an increase in crude fiber. In the foliage of nondeciduous shrubs the levels of all constituents investigated remained approx, constant throughout the season. In the foliage of the deciduous trees and shrubs silica-free ash and Ca increased; P, K, and protein decreased; and fiber varied but little. In the leafage of half-shrubs, ash, P, K, and protein decreased, fiber increased, and Ca varied but little. The findings are of importance in the utilization of the lands concerned. A W Sameson in the utilization of the lands concerned.—A. W. Sampson.

13810. GUDKOV, A. N. Approbatzia Pshenitz Morphologo-Khimitcheskim Metodom, po Zelenym Rasteniam. [Certification of wheats by morphological method, on green plants.] Selektzia i Semenovodstvo [Plant Breeding and Seed Growing 9(1): 32-35. 1939.—The author describes his chemical tests for purity of wheat vars. for certification purposes. He uses a NaOH soln. The different colors of the leaves corresponded to the conclusions at field inspection of the crop made later. The chemical test also can be used on immature grain, so that the certification can be made 29-35 days before harvest, while by the usual field method, certification can be made only 10-12 days before harvest. This chemical method also is more objective, and is less liable to errors of judgment.—J. W. Pincus.
13811. GUDKOV, J. N. Zassukha i protzess Tzvetenia u

Kukuruzy. [Drought and the process of blossoming in maize.] Selektzia i Semenovodstvo [Plant Breeding and Seed Growing] 9(2/3): 21-25. 1939.—One of the causes of poor yields of corn is the divergence between the blooming time of the tassels of corn, and the silking period of the cob. The period of blooming of the tops—5-7 days under normal conditions—is usually shortened by drought to 1-2 days. In addition the tassels show more sterility during drought. The period of silking also is shortened during drought. Tables showing the length of the blooming, etc. are given for different vars. The difference between the time of blooming of the Ω and the Δ blossoms causes sterility, or rather failure of pollination. Among the world collection of corn planted in these tests, there were found certain ecological groups of corn in which the blooming of corn and the formation of silks are closer together, not exceeding 3 days. Maize from Italy, Spain, Czechoslovakia, Ukraine, and Caucasus also has a short period, 5-7 days, between the tasseling and silking. For Russian conditions, it will be necesary to hybridize these with American vars. J. W. Pincus.

13812. HAMID, M. ABDUL. Longevity of cotton seed delinted with sulphuric acid. Empire Cotton Growing Rev. 15(4): 312-314. 1938.—After being stored for 1 yr. cotton seed delinted with H_2SO_4 showed slightly more deterioration

than similar undelinted seed.—J. F. O'Kelly.

13813. HARDENBURG, E. V., and HANS PLATENIUS.
A preliminary report on the waxing of seed potatoes. Amer. Potato Jour. 16(2): 37-40. 1939.—Dormant seed-potato tubers of the Smooth Rural type were placed in dark cellar storage on March 15. One-half of the uncut tubers were treated with a 30% conc. of 231-B wax emulsion obtained from the Franklin Research Company to determine the effect of waxing on weight loss and sprouting in storage and on emergence and yield. Up to planting time (June 3), waxing reduced weight loss in storage 37% for the 80-days period and stimulated germination. The authors explain the latter on the basis of increased cell turgor. The wax treatment hastened emergence and resulted in a statistically significant yield increase of 28.6 bushels to the acre or 15.5%.—E. V. Hardenburg.

13814. HESSLER, L. E., D. R. ERGLE, N. E. RIGLER, and J. E. ADAMS. Composition of bark and inner part of roots of the cotton plant. Jour. Amer. Soc. Agron. 31(6): 528-540. 1939.—Roots of cotton plants grown on unfertilized Wilson clay loam soil were separated by peeling into bark and stele. Segregates made periodically, from early square formation to early opening of bolls, were analyzed for certain carbohydrates and electrodialyzable components. The labile carbohydrates and nitrogenous fractions are most abundant in the bark. The stele contained more polysac-charides and both dialyzable and non-dialyzable P₂O₅, and the P2O5 is increased by phosphate fertilizers. All nitrogenous fractions studied are influenced by the composition of the fertilizer; the cathode-nitrogen constituents of the bark were affected most. Ketose sugars appear to play an important part in the physiology of the cotton plant .-J. E. Adams.

13815. HURST, L. A., A. W. SKUDERNA, and C. W. DOXTATOR. A study of high and low levels of soil fertility response to two varieties of sugar beets. Jour. Amer. Soc. Agron. 31(7): 649-652. 1939.—Two domestic vars. of sugar beets designated as a "sugar" and a "tonnage" var. were compared in their reaction to different fertilizers and to different rates of fertilizer application. With the "sugar" var. 400 and 600 pounds per acre of fertilizer lowered performance insignificantly as compared with 200 lbs. of fertilizer. With the "tonnage" var. 400 and 600 lbs. of fertilizer slightly increased yields, sugar %, and sugar per fertilizer slightly increased yields, sugar %, and sugar per acre, although only the 600-lb. application produced significant differences. Attention is called to the need of determining whether a var. is a "strong" or "weak" feeder so that a more adequate program of soil fertilization may be developed.—A. W. Skuderna.

13816. JONES, J. W., J. M. JENKINS, R. H. WYCHE, and M. NELSON. Rice culture in the Southern States. U. S. Dept. Agric. Farmers' Bull. 1808. ii +29. 20 fig. 1938.—Cultural and field methods wars introstion harvesting and

Cultural and field methods, vars., irrigation, harvesting, and threshing practices involved in rice production in the Southern States are described, and information is provided

on the history and status of the crop and its adaptation, production costs, control of diseases, insects, and weeds, and the milling and utilization of rice.—Courtey Exp. Sta. Rec.

13817. KHATUNTZEV, J. A. Vlianie Temperatury Vozdukha na Klubneobrazovanie i Rost Kartofelia. [The influence of temperature of air and soil on tuber formation and growth of potatoes.] Selektzia i Semenovodstvo [Plant Breeding and Seed Growing 9(1): 40-43, 1939.—High temps. of air and soil delay the formation of tubers, reduce yields, and retard the maturing of potatoes. The early maturing vars. are least affected, the late maturing vars. the most affected (tuber-formation sometimes is completely inhibited). The expts., mainly conducted at the Ulanof Potato Station, are confirmed by numerous field expts. done by Lyssenko (so-called summer planting of potatoes). The vars. that mature early give much better yields in the south and south-east of Russia. In producing new vars. for the south and south-east, it is necessary to consider this unfavorable ecological factor-high temp. It is possible to select the parental pairs for crossing and develop vars. which will produce tubers under high temps.—J. W. Pincus.

13818. KARRAKER, P. E. Nitrogen removed by drainage and cropping from lysimeters as affected by kind of vegetative cover. Commercial Fertilizer 58(3): 18-19, 1939.

13819. KREUTZ, H., und M. von SCHELHORN. Über Züchtungsversuche bei winterannuellen Hülsenfruchtern. Pflanzenbau 15(3): 99-117. 1938.

13820. LANCASTER, H. M. Malting quality of spring barleys, 1933-1936. Jour. Nation. Inst. Agric. Bot. 4(3): 287-292. 1938.—Seven vars. of spring barley grown during 4 yrs. were compared as to malting quality and these values checked against the commercial prices offered for the grains. Six malts were, in certain years, nearly identical but the prices offered varied by 12 shillings per quarter, showing the maltster's idea of value based upon appearance may be erroneous. Complete tables for the 4 yrs. are presented, showing the comparative weights, N percentages, and valuations of the barleys, as well as the brewer's extracts, soluble N percentages, valuations, and the proportion of the N that is soluble in the malts from the several barleys. Finally, there is a summation table.—H. Dorsey.

13821. LAURILA, VEIKKO. Koti-ja ulkomaisia perun-ajalosteita vertailevissa kokeissa Maatalouskoelaitoksen Kasvinjalostusosastolla vuosina 1932-1937. [Finnish and foreign potato vars. in comparative tests at the Division for Plant Breeding of the Central Experiment Station during the years 1932-1937.] Valtion Maatalouskoetoiminnan Julkaisuja [Helsingfors] 101. 1-55. 1938.—The publication reviews test-results of 84 Finnish and foreign potato vars. The investigation aimed at yield, growth, resistance to diseases, form, weight, flavor, mealiness, eyes, % of starch and the keeping quality of tubers. The standard var. in these tests in the years 1932-1936 was Deodara and during 1936-1937, Rosafolia.—K. Multamäki.

13822. McCOOL, M. M. Fertilizer value of colloidal phos-

phate. Contr. Boyce Thompson Inst. 10(3): 257-266. 2 fig. 1939.—Samples of Florida pond or colloidal phosphates are high in the colloidal fraction and more strongly buffered than finely ground Tennessee brown rock phosphate, especially on the alkaline side. There is more total and dilute sulphuric on the alkalme side. There is more total and didde surphuric acid-extractable P₂O₅ in the silt fraction than in the colloidal fraction, yet a given amt. of P₂O₅ applied to the soil in the latter produces a larger yield of millet than it does when added in the former. Large increases in the yield of plants result from the addition of colloidal phosphates to each of the 3 acid phosphorus-deficient soils. tested in the greenhouse or in the field, colloidal phosphate and Tennessee brown rock phosphate do not differ significantly as a source of P₂O₅. Colloidal phosphate is more readily available when mixed with 4 inches of soil than when placed below 5 inches of it.-Auth. summ.

13823. MANGELSDORF, P. C., and R. G. REEVES. The origin of maize. Proc. Nation. Acad. Sci. U. S. A. 24(8): 303-312. 1938.—There have been 3 general theories regarding the origin of maize: (1) that it originated from podcorn, Zea mays tunicata, which differs from normal maize primarily by a single dominant gene governing the development of a brittle, disarticulating rachis and the production of prominent glumes enclosing the seeds; (2) that maize

originated from teosinte, Euchlaena mexicana, by direct selection, by large scale mutations or by the hybridization of Euchlaena with a grass now unknown; (3) that Zea, Euchlaena and Tripsacum, the 3 American Maydeae have descended along divergent and independent lines from a remote common ancestor. New evidence from cytogenetic studies at the Texas Expt. Station suggest that Euchlaena has had no part in the ancestry of maize, but is instead the product of natural hybridization of Zea and Tripsacum. Euchlaena which is intermediate between Zea and Tripsacum in many characteristics differs genetically from Zea primarily by 4 segments of chromatin, all of which have genes with Tripsacum effects. Hybrids of Zea and Tripsacum have shown that there is some association between chromosomes of the 2 genera and that interchanges of chromatin may occur. The combined data agree in pointing to the comparatively recent origin of Euchlaena as the result of natural hybridization of Zea and Tripsacum. With Euchlaena eliminated from a rôle in the origin of maize, it is reasonable to assume that maize originated as a mutation from a wild pod-corn once indigenous, and perhaps still to be found, in the lowlands of S. America. The primary center of domestication probably occurred in the Andean region of Peru and Bolivia. Historical and archaeological evidence supports this view. The hybridization of Zea and Tripsacum which occurred when the 2 genera were brought into contact with each other in Central America gave rise not only to the new genus Euchlaena, but to new forms of maize which spread in both directions, almost completely replacing pure maize in all regions except the Andean. Cytological evidence on chromosomal knobs supports the view that almost all modern maize vars. are contaminated with Tripsacum.-P. C. Mangelsdorf.

13824. MURPHY, H. F. The rôle of kaolinite in phosphate fixation. *Hilgardia* 12(5): 341-382. 4 fig. 1939.—The high phosphate-fixing capacity of soils having a low silicasesquioxide ratio may be attributed to the type of clay minerals present as well as to the sesquioxide activity. Kaolinite has a high capacity to adsorb phosphates. In soils where this clay mineral is abundant, application of small amts. of soluble phosphates has little or no effect on plant growth; larger applications are needed. This is attributed to the low degree of saturation of the colloid. Row fertilization or the use of larger phosphate-bearing particles is recommended for such soils. The favorable results secured from such treatments are due to a retention of the soluble Ca phosphate in the large particles for a longer period of time and the higher degree of phosphate saturation of the colloids in contact with the phosphate fertilizer.—H. F.

Murphy.

13825. PAINE, H. S., F. H. THURBER, R. T. BALCH, and W. R. RICHEE. Manufacture of sweet potato starch in the United States. Indust. and Engineer. Chem. 30(12): 1331-1348. 18 fig. 1938.—Operating data and a description of the new manufacturing processes in the new plant built in Mississippi with the aid of federal funds are given.—M. C. Moore.

13826. PATERSON, J. W. Science in agriculture. 288p. Illus. Longmans, Green and Co.; London, [1938]. 13827. PAUL, W. R. C. Green manures for paddy in the dry zone of Ceylon. Trop. Agric. [Ceylon] 92(2): 83-88. 3 fig. 1939.—Observations carried out on a few leguminous plants suitable for growing as a green manure in paddy (rice) fields of the dry zone indicate that where a quick-growing green manure is required in the alternate season when no paddy is cultivated, sunn hemp (Crotalaria juncea) is the most suitable, but seed has to be grown and collected again for resowing the following year. Tephrosia purpurea, or preferably T. villosa, is slower growing, but when once established need not be resown as it is capable of shedding ts seed, which remain dormant until the next paddy crop s harvested. It is more drought-resistant than sunn hemp. chaseolus lathyroides grows in association with paddy and it about the same rate, provided the fields are not kept nundated too long. Sesbania speciosa can also germinate vith paddy but it does not develop at the same rate as he paddy plant, though after the harvest of the paddy, it rows more rapidly. It does not form an even stand, but he seeds when shed can remain dormant in the soil for everal months.—W. D. Pierce.

13828. PESOLA, VILHO A. Hopea-kevätvehnä. [Hopea spring wheat.] Valtion Maatalouskoetoiminnan Tiedonantoja [Helsingfors] 145. 1-18. 1938.—Hopea originated from the cross Marquis × Ruskea. It was put on the market in the year 1936. It is 3-5 days earlier than Diamant (Svalöf). It is adapted to cultivation in southern Finland up to about 61° 30′ N lat.—In addition to its advantageous growing properties the baking quality of Hopea is good, somewhat better than that of Diamant.—K. Multamāki.

13829. PESOLA, VILHO A. Sopu-kevätvehnä ja sen lähimmät kilpailijat. [Sopu spring wheat and its most important competitors.] Valtion Maatalouskoetoiminnan Tiedonantoja [Helsingfors] 150. 1-17. 1938.—The parents of Sopu spring wheat are Marquis and Ruskea. The bulletin gives an account of results of tests with Sopu, carried out at the Division for Plant Breeding (Jokioinen) and at various expt. stations and local expt. fields. On account of its earliness Sopu is suitable for central Finland and the southern parts of East Bothnia, from about 61° 20′ to 62° 10 N lat. The other characteristics of Sopu are also favorable, and its baking quality is fairly good.—K. Multamāki. 13830. PESOLA, VILHO A. Sinikka, uusi vihreā talou-

sherne. [Sinikka, a new green cooking pea.] Valtion Maatalouskoetoiminnan Tiedonantoja [Helsingfors] 158. 1-15. 1939.—The parent vars. of Sinikka pea are the Svalöf cooking pea vars. Gyllen and Concordia. Sinikka is late, tall, vigorous, and gives a good yield. The seed is greenish-blue, round, rather large, tasty, and cooks fairly rapidly. Sinikka is a profitable var. when grown together with oats, and suitable for household use as well as for fodder.-K. Multamāki.

13831. POVOLOTZKI, P. K. Novii Sort Ozimoi Pshenitzy. [A new variety of winter wheat.] Selektzia i Semeno-vodstvo [Plant Breeding and Seed Growing] 9(2/3): 25-26. 1939.—A new hybrid of the American vars., "Kanred" and "Fulcaster" No. 266287 was developed at the Kuban Station of VIR. The original hybrid was obtained from Dr. Parker, formerly of Kansas Station (now with Kansas Wheat Commission). After 5 years of breeding and testing, this new hybrid outyields and extensively replaces several Russian standard vars., such as "Ukrainka," "Stavropolka" etc. It is more hardy, does not shatter, and is more drought-resistant. J. W. Pincus.

13832. ROSENFELD, ARTHUR H. The deterioration of harvested sugar-cane. Some experimental studies in Egypt. Trop. Agric. [Trinidad] 15(9): 203-209. 3 fig. 1938.tables and charts the progressive deterioration in weight, richness, juice purity and recoverable sugar with the days after cutting, together with the progressive increase in the glucose coefficient (% sucrose) are demonstrated. Bibliography of 32 titles.—W. D. Pierce.

13833. RUTCHKIN, V. N., i N. I. ZELENSKAYA. Vlianie Zimnykh Kholodov na Semennoye Zerno. [The influence of winter temperature on seed grain.] Selektzia i Semenovodstvo [Plant Breeding and Seed Growing] 9(2/3): 11-14. 1939.—Trials at the Omsk Agric. Institute (now called The Kirov Institute) show that severe cold weather does not lessen the germination of grain, or the growth of seedlings from grain, having 17-18% moisture, but if the moisture content is greater than 18%, vitality is impaired. Cooling of seed grain with moisture in excess of 14.5%, retards afterripening, hence it is not advisable to freeze the seed grain to improve its keeping qualities.-J. W. Pincus.

13834. SALAMAN, R. N. Report of the potato synonym committee. Jour. Nation. Inst. Agric. Bot. 4(3): 293-297. 1938.—57 stocks of potatoes were grown and examined for trueness to name and for freedom from wart disease. Of these, 43 were found to be distinct vars. and free from

disease .- H. Dorsey.

13835. SAVITZKY, M. S. Opyt Predvartelnogo Pokaza Sortov Zernovykh Kultur na Utchastke VSK hV. [The experiment of preliminary exhibition of varieties of grain crops at the All Union Agricultural Fair.] Selektria i Semenovodstvo [Plant Breeding and Seed Growing] 9(1): 43-48. 1939.—Illustrations and descriptions of vars. of grain sown on test plots at the Agric. Fair in Moscow. Tables giving the vars. of barley, wheat, oat, maize, proso (millet). etc., are given.—J. W. Pincus.

13836. SINGHI, B. N., and K. DAS. Effectiveness of con-

tact sprays in the control of annual weeds in cereal crops. Jour. Amer. Soc. Agron. 31(3): 200-208. 1939.—Replicated expts. on the control of annual weeds in a wheat field of known history by the use of 3 contact sprays—H₂SO₄ (1), NH SCN (2), and CuSO (3)—indicate that the degree of control differed with the different weeds and herbicides. Anagallis arvensis and Euphorbia dracunculoides showed higher degrees of reduction than Chenopodium album, explainable on the morphological peculiarities and the relative hardiness of the weeds as well as on the quantity of spray soln adhering on the surface; the herbicides showed effectiveness in the decreasing order of (1), (2), and (3). Contributory factors that apparently aided in the effectiveness of the treatments are the conc. of the herbicides, the time of their application, the stage and development of the plants, the leaf area exposed, and the temp. and humidity of the atmosphere. The differences were not statistically significant. The yield of the grain tended to increase with a reduction in weed density, but the differences with the control plats were not always statistically significant. Spraying with a higher conc. of (2) soln. gave significantly better results because of the addition of extra nutrients besides the elimination of weed competition. Spraying with (1) did not make the soil sour. The small differences in pH, if any,

were not significant.—Auth. summ.

13837. SMITH, ALLAN K., and SIDNEY J. CIRCLE.
Peptization of soybean proteins. Extraction of nitrogenous constituents from oil-free meal by acids and bases with and without added salts. Indust. and Engineer. Chem. 30 (12): 1414-1418. 3 fig. 1938.—A study of the extraction of nitrogenous matter from oil-free soybean meal, wheat, tepary beans, and Alaska peas over a wide pH range by water and various acids (HCl, HO₂C₂Cl₃, H₂SO₄, H₃PO₄, HaC₂O₂) NaOH and Ca(OH)₂. Water extracted more protein than the acids; alkalis were the most effective dispersing agents. With a low salt conc., the pH has a greater influence on the amt. of protein dispersed than when the salt conc. is increased.—M. C. Moore.

13838. STITT, R. E. The response of lespedeza to lime and fertilizer. Jour. Amer. Soc. Agron. 31(6): 520-527. 2 fig. 1939.—On a Cecil loam soil which had received a complete fertilizer during the previous season Korean lespedeza did not give a significant response to lime and fertilizer and Kobe lespedeza responded slightly to lime. On a Cecil gravelly loam soil, which was too poor for normal growth without treatment, Kobe, Korean, common, and sericea lespedeza responded to lime and phosphate. In their ability to withstand drought under conditions of low phosphate availability the lespedeza vars. ranked with Kobe first, Korean second, and common third. The Ca and crude protein content of Kobe and Korean lespedeza plants growing on the Cecil gravelly loam were increased by the application of both lime and superphosphate and the P content by application of superphosphate.—R. E. Stitt.

13839. THOMPSON, E. G. Spring barley trials, 1933-1937. Jour. Nation. Inst. Agric. Bot. 4(3): 275-286. 1938.—Seven vars. of barley were compared during a period of 5 yrs. at 6 centers in England but the entire number was usually not complete. Half drill strips were used the first 3 yrs. and the randomized system thereafter. 35/7 (1935 Plumage Archer) led in yield with no great divergence for

the other 6 vars.-H. Dorsey.

13840. TYSDAL, H. M., and T. A. KIESSELBACH. The differential response of alfalfa varieties to time of cutting. Jour. Amer. Soc. Agron. 31(6): 513-519. 1939.—Results at the Nebraska Agric. Expt. Station from harvesting 4 vars. of alfalfa, Grimm, Common, Hardistan, and Ladak, at various stages of maturity during several yrs. indicate that the comparatively new var., Ladak, has a somewhat later optimum stage for maximum hay yield than do the other vars. When all cuttings were taken at a late stage the Ladak gave significantly the highest annual yield; its yield was lowest when cut early throughout the season. The hardier and more wilt-resistant vars., Hardistan and Ladak, were less adversely affected as to loss of stand in the frequent cutting treatments than were Grimm and Nebraska Common. While the 4 vars. did not differ materially in time or amt. of blooming in the 1st cutting, the Grimm and Common bloomed earlier and more profusely in the

2d and 3d cuttings. Since it is difficult to determine accurately the stage of maturity of alfalfa vars., it is suggested that it would be advantageous, in the case of new vars. at least, to conduct tests so that their relative yields could be detd. in comparison with standard vars. by harvesting replicate plats of all at 2 or more stages of

maturity.—Authors.
13841. VANDERLINDEN, L. Boron and other elements in sugar beet culture. Their influence on tonnage, sugar content, and blackroot control. Amer. Fertilizer 90(4): 5-7.

13842. VARIOUS AUTHORS. Industrial utilization of agricultural products. Indust. and Engineer. Chem. 31(2): 141-180. 1939.—A symposium treating the rôle of the department of agriculture, plastic materials and farm products, cellulosic agricultural by-products, industrial use of starch products, industrial utilization of fats and oils, alcohol from farm products, utilization of naval stores, agricultural products as insecticides, fermentation processes and industrial uses of furans.—M. C. Moore.

VENGRENOVSKI, S. O Raionirovanii Sortov [Regionalisation of varieties of alfalfa.] 13843. Selektzia i Semenovodstvo [Plant Breeding and Seed Growing] 9(3/4): 42-43. 1939.—"Grimm Zaikevitch" standard var. of alfalfa, developed from the original (American) Grimm by Zaikevitch. This var. was compared in test plots by the Odessa Genetic Institute with a number of "Blue Ukrainan" vars, also with the following other vars.:
Ontario (evidently Variegated), French, Arabian, Hungarian,
Turkestan, Little Asian, and "Yellow" Krasnokut Station "Grimm Zaikevitch" gave the largest yields; several of the Ukranian blue vars. also gave excellent yields of green substance and seed. A table showing frost-resistance of 11 vars. also is given, and several of the Ukrainan blues, and the "Khiva" var., were more resistant than "Grimm the "Khiva" var., were more resistant than Zaikevitch."—J. W. Pincus.

13844. VOSS, J. Weitere Untersuchungen über Ent-wicklungsbeschleunigung an Weizensorten, insbesondere an Winterweizen. [Further investigations on iarovization wheats, especially winter vars.] Pflanzenbau 15(1): 1-35.

Illus. 1938.

13845. [ANONYMOUS.] The Tonka bean. Jour. Jamaica Agric. Soc. 42(9): 399-401. 403-406. 1938.
13846. ANONYMOUS. Jemtchujina Svalefa. [Gem of Svaloff.] Selektzia i Semenovodstvo [Plant Breeding and Seed Growing 9(2/3): 45-46. 1939.—A new Swedish variety of winter wheat, developed by the Vermland branch of Swedish Plant Breeding Station, is briefly described. It gave higher yields and had stronger straw than the standard vars.—J. W. Pincus.

SOIL SCIENCE (EDAPHOLOGY)

13847. ALEXANDER, LYLE T., HORACE G. BYERS, and GLEN EDGINGTON. A chemical study of some soils derived from limestone. U. S. Dept. Agric. Tech. Bull. 678. 1-27. 1939.—Chemical and physical studies were made on 10 profiles of soils derived from parent material residual from the decomposition of limestone. The soils chosen included 3 profiles of Hagerstown and 1 each of Frederick, Maury, Dewey, Decatur, Fullerton, Greenville and Lebanon.
The gross chemical composition of the soil colloid does not always reflect the zonal and intrazonal group differences noted between the soils from which they came. Local variations in the soils were apparently caused by variation in the parent rock and relief, while differences between soils, derived from similar parent rocks in widely separated localities are largely due to climatic differences. The ratio of silica to bases of the colloid fraction correlates well with the productivity of these soils except where physical factors

become dominant.—L. T. Alexander.

13848. BONNET, J. A. [The edaphological classification (soil survey) of the soils of Puerto Rico and its agricultural importance.] Rev. Agric. Puerto Rico 28(1): 95-98. 1936.— The completion, in July 1936, of its soil survey made Puerto Rico the one country in the world to have completed such a survey of all its lands. The work required 8 yrs.—

Courtesy Exp. Sta. Rec. 13849. BOUYOUCOS, G. J., and A. H. MICK. A method for obtaining a continuous measurement of soil moisture under field conditions. Jour. Amer. Soc. Agron. 31(3): 271. 1939.

13850. BOYNTON, DAMON. Capillary tension as a measure of the pore space unoccupied by water in some dense orchard subsoils. Soil Sci. 47(5): 347-352. 1939.

13851. COLE, JOHN S., and O. R. MATHEWS. Subsoil moisture under semiarid conditions. U. S. Dept. Agric. Tech. Bull. 637, 1-70, 1939.—Data obtained at 5 exptl. field stations in the Great Plains during the period 1907-1936 are presented showing the water content of each foot section of soil in the spring and at harvest time on plots continuously cropped to wheat, alternately fallowed and cropped to wheat, and in native sod. Soil samples were taken with a 20 mm. King soil tube to a standard depth of 6 ft., but in some instances to 10 ft. or more. Under semi-arid conditions, the soil within the zone of normal wheat-root development is usually dry at harvest time. Under continuous grain production, there is an annual cycle of water accumulation and discharge. The depth to which water penetrates depends upon the quantity of precipitation and the character of the soils. As a general rule, the entire annual cycle of charge and discharge is confined to only a portion of the zone in which roots can develop freely, and no water reaches the underlying subsoil. In a few exceptional yrs. on some soils a small quantity penetrates beyond the reach of wheat roots. The addition of fallow to the cropping system lengthens the period of water accumulation, increases the depth of soil that functions, and increases the number of times when water reaches the underlying subsoil. Water charge and discharge are much the same under sod as under continuous grain, but available water is completely removed to a lower depth under the sod. The net result of the production of annual crops in the semi-arid section has been an increase rather than a decrease in subsoil water.-J. S. Cole.

13852. DUNKLE, E. C., F. G. MERKLE, and R. D. ANTHONY. Potash availability studies in Pennsylvania orchard soils. Jour. Amer. Soc. Agron. 31(5): 438-458. 1939. —In 47 commercial orchards in Pennsylvania, the replaceable K was significantly greater in the surface soils than in the subsoils and in general the replaceable K was related to the organic matter content of the soil. Loss of surface soil by erosion was a factor increasing the need of applied K. Rapid methods for determining soil K compared to determining the general level of soil K. Leaf analyses for K did not correlate with the replaceable soil K but in some cases gave indications of the effects of K₂O application which could not be detected by exchange analyses. Certain soil series contained more replaceable K than others. A few were notably low.—F. G. Merkle.

13853. Du TOIT, A. L. II. Section B: Geological and soil characteristics in relation to deterioration and conser-

13853. Du TOIT, A. L. II. Section B: Geological and soil characteristics in relation to deterioration and conservation of natural resources, etc. in the Union. S. African Jour. Sci. 35: 470-476. 1939.—The soils of South Africa being essentially sub-tropical are commonly deficient in humus, N and P₂O₅, on the whole delicate and their regeneration after damage slow and difficult. Enormous harm has resulted from gully- and sheet-erosion, deforestation, bad farming methods and overgrazing. More careful treatment is urged and a special State Reclamation Service advocated to cope with the dangerous position already developed.—A. L. du Toit.

13854. FREISE, F. W. Erhärtungsvorgänge und Mineralmeubildungen in durch Einwirkung von Pflanzenverfallsäuren im Tropenurwald entstandenen Granitersatz. Zentralbl. Mineral., Geol. u. Paläontol. Abt. A. 1937: 225. 1937.

—The influence of acids, formed by the decay of plants
upon minerals was tested in the laboratory throughout 18
years by the continuous action of marshy water upon
calcareous granite. Extensive decomposition was observed.
followed by a cementlike hardening under the influence of
air.—Courtesy of Kolloid Zeitschr.

13855. GOURLEY, J. H., and IRVIN W. WANDER. The lateral distribution of potassium in an orchard soil. Jour. Amer. Soc. Agron. 31(7): 590-597. 1 fig. 1939.—Holes were bored to a depth of 18 inches with a king soil tube, beneath apple trees at Wooster, Ohio. Either K. SO.4 or KCl was mixed with part of the soil removed and placed in the

lower 12 inches of the hole, the top 6 inches receiving soil only. 3 years later samples were taken at increments on either side of the placed fertilizer and quick tests for available K revealed that lateral movement had occurred on the average of about 6 to 8 inches to either side. The exact pattern depended on the type of fertilizer salt used and on the slope and texture of the soil.—Authors.

13856. HASTY, A. H., EARL D. FOWLER, R. T. AVON BURKE, W. H. BUCKHANNAN, Z. C. FOSTER, and G. L. FULLER. Soil survey of Decatur County, Georgia. U. S. Dept. Agric. Bur. Pl. Indust. 1933(24): 1-44. Map, 3 pl., 1 fig. 1939.

13857. HENIN, S. L'influence des facteurs climatiques sur la stabilité structurale des sols de limon. Ann. Agron. [Paris] 9(2): 301-311. 1939.—The rain factor tends to impart to silts a structure which reflects rain intensity. The natural "cements" of the physico-chemical soil complexes resist this rain factor. The effect of rain on soil structure varies through the year, reaching a maximum in the Spring. It is known practically that the structural stability of these soils is high at this time.—R. R. McKibbin.

13858. HESTER, JACKSON B., and F. A. SHELTON. Geographical location and soil organic matter. Jour. Amer. Soc. Agron. 31(7): 598-603. Map. 1939.—The mean organic-matter content of sandy loam soils in Colborne, Canada is 12% higher than sandy loam soils in Tifton, Georgia. There is a difference of 25° F in the mean annual temp. and 15 inches of rainfall of the 2 sections. Silt loam soils in a lateral direction from New Jersey to Indiana increase in organic matter as the rainfall decreases.—J. B. Hester.

13859. MOORE, ROSS E. Water conduction from shallow water tables. Hilgardia 12(6): 383-426. 2 fig. 1939.—Soil columns were investigated under conditions of capillary rise with water applied to their bases at constant pressures sufficient to maintain saturation in the lower portions. The permeability of soils to water, K, was studied as a function of moisture content, P_w (determined by sampling) and pressure potential, ψ (measured directly with tensiometers placed in the soil), under steady state conditions and for saturated and unsaturated flow. Permeability is a maximum near saturation and decreases rapidly with decreasing P_w and ψ to approximately the moisture equivalent at which P_w it is very low and remains constant or decreases only slightly with decreasing P_w . At this point $\partial K/\partial \psi = 0$ (approximately). The P_w of the wetted front generated as water rises through a dry soil above a water table is approx. equal to the P_w at which $\partial K/\partial \psi = 0$ and represents the point at which the capillary permeability of the soil becomes zero. The soils arranged in order of permeability are, for saturated flow,

sand > fine sandy loam > light clay > clay and for unsaturated flow at $\psi=-100$

sand < fine sandy loam < light clay < clay. In order of ψ at which capillary permeability is approximately zero:

sand > fine sandy loam > light clay > clay. Hysteresis in the relation of ψ to P_{w} was found for all soils, according to whether they were wetting or drying. At a given P_{w} , ψ increases with increasing temp. This relation causes wide fluctuations in the elevation of the water table and in the rate of water uptake during periods of temp. change.—R. E. Moore.

13860. REILLY, J., D. F. KELLY, and J. DUFFY. Studies in peat. V. Extraction of peat with azeotrope-like petroleum mixed solvents. Sci. Proc. Roy. Dublin Soc. 22 (12): 149-155. 1939.—Mixtures of certain petroleum spirits with the alcohols methyl, ethyl, isopropyl, and n-propyl extracted 10-14% of waxes from Irish peat in contrast to yields of 6-8% when the petroleum spirits were used alone as solvents. The mixtures behaved on distillation like azeotropes, and the presence of wax and/or water in the solvents did not interfere with the practically constant distillation temps. of the mixtures. Analytical data for the waxes and distillation curves are given.—Authors.

13861. SIMMONS, CHARLES F. The effect of carbon dioxide pressure upon equilibrium of the system hydrogen colloidal clay-H₂O-CaCO₃. Jour. Amer. Soc. Agron. 31(7): 638-648. 1939.—Electro-dialyzed colloidal clay from a Miami

clay subsoil was suspended in saturated Ca(OH)₂ solns. and equilibrated at 7 pressures of CO₂ ranging from 0.00033 to 0.05000 atmospheres. The amt. of Ca absorbed by the clay was found to be inversely proportional to the cube root of the CO₂ pressure expressed in atmospheres. pH values of pure carbonate systems at the CO₂ pressures studied were in fair agreement with calculated values. The pH values of the clay-carbonate systems were consistently higher than pH values of the pure carbonate systems at corresponding pressures.—C. F. Simmons.

13862. SOUCI, S. W. Beiträge zur chemischen Kenn-

13862. SOUCI, S. W. Beiträge zur chemischen Kennzeichnung und analytischen Untersuchung des Torfes. Kolloid Zeitschr. 82(1): 87-99. 1938.—Small amts. of NaOH or KOH cause a peptisation of humic acid, without making the soln. alkaline. This method is well adapted for the extraction of humic acid from peat. The extraction with alkalies (especially NaF) is not suitable for quantitative determinations. Treatment with acetylbromide is much better as it enables separation into the following groups:

minerals, bituminous substances, cellulose, hemicellulose, pectin substances, humic acid, and lignin.—M. Neuhof. 13863. VOLK, N. J. The oxidation-reduction potentials

13863. VOLK, N. J. The oxidation-reduction potentials of Alabama soils as affected by soil type, soil moisture, cultivation, and vegetation. Jour. Amer. Soc. Agron. 31 (7): 577-589. 1939.—24 soil types scattered all over the northern \(\frac{3}{2}\) of Alabama were sampled every 2 weeks at 3 depths—0-8 in., 8-16 in., and 16-24 in. Analyses were made for moisture content, soil Eh, and pH.—Cultivated arable Alabama soils have only a slightly higher Eh than do noncultivated soils. Differences in Eh due to soil type are seldom over 50 mv. Fluctuations in the Eh of a soil bear a direct relation to fluctuation in soil moisture; however, these fluctuations seldom exceed 60 mv. in arable Alabama soils. Eh determinations apparently do not reveal whether or not an arable soil is in an oxidized or reduced state since the Eh is dependent not only on the ratio of oxidized to the reduced phases of the ions present but also on the kinds and relative amounts of the ions present.—N. J. Volk.

HORTICULTURE

F. C. BRADFORD, Editor

(See also in this issue Entries 12502, 12518, 12521, 12522, 12527, 12529, 12534, 12535, 12537, 12538, 12569, 13826, 13830, 13842, 13855, 13977, 13980, 13982, 13983, 13986, 13987, 13988, 14000, 14001, 14002, 14014, 14018, 14027, 14030, 14035, 14038, 14072, 14079, 14093, 14094)

13864. BLAKE, M. A. Hardy rootstocks for the peach should extend well above the surface of the soil. *Proc. Amer. Soc. Hort. Sci.* 36: 138-140. 1938(1939).—Winter injury to the peach in regions similar to New Jersey occurs largely to parts above ground or only slightly below. Hardy stocks should therefore extend at least 18 to 24 inches above the soil. Such trees have been propagated for test in New Jersey.—M. A. Blake.

in New Jersey.—M. A. Blake.

13865. BOBB, A. C., and M. A. BLAKE. Annual bearing in the Wealthy apple was induced by blossom thinning. Proc. Amer. Soc. Hort. Sci. 36: 321-327. 1938(1939).—A 19-yr.-old biennially bearing Wealthy was first blossomthinned in the spring of 1935 at the cluster-bud stage. The best procedure consisted of the removal of all terminal buds during the dormant-season pruning, as well as all axillary and weak spur clusters termed Class III and IV during the cluster-bud stage. The stronger spur clusters, termed Class I and II, were thinned when necessary, leaving them 12-15 inches apart. This procedure increased the leaf area upon the blossom-thinned spurs. Fruit set and fruit size was increased on the remaining spurs. The blossom-thinned tree had consecutive yields of 22.12, 26.12, 23.75 and 17 bushels; the check tree yielded 19.5, 0.0, 20.5 and 1.25 bushels in the same consecutive years.—Authors.

13866. BOYNTON, DAMON, and WALTER REUTHER. Seasonal variation of oxygen and carbon dioxide in three different orchard soils during 1938 and its possible significance. Proc. Amer. Soc. Hort. Sci. 36: 1-6. 1938(1939) .-Seasonal variation of O2 and CO2 percentage was detd. during an entire year in the atmosphere of a heavy silty clay loam, of a light silty clay loam, and of a sandy loam orchard soil at depths from I to 6 feet. The year was preceded by an abnormally wet fall, and included a very dry summer. While the atmosphere of the sandy loam had high percentages of O. both during the winter and the growing season, in the heavier soils there were rather protracted periods when O2 was low or absent at depths below 1 foot. Below 4 feet, O2 rose above 5% a month later in the heavy silty clay loam than in the light silty clay loam, and it dropped in the heaviest subsoil to below 5% following a 6½ inch rain in Sept. 1938. These differences in O₂ percentage were correlated with differences in non-capillary porosity. CO₂ percentage increased materially as depth of sampling increased; but there was no exact inverse relationship between O2 and CO2 percentage, and max. values seemed to occur at about 13%.-D. Boynton.

13867. BREGGER, J. T. Contour planting and terracing as a basis for soil and water conservation in orchards. *Proc. Amer. Soc. Hort. Sci.* 36: 7-12. 1938(1939).—At present the contour orchard acreage in the U. S. aggregates about 40,000. Types of orchard terraces are classified as to grade,

profile, method of construction; also systems of contour planting and terrace arrangement, such as use of "master terraces," radial rows, etc. Auxiliary methods of erosion control include cover crops, mulching, etc. Favorable effects of contour planting on tree growth and yields, and present problems arising from contour orchard planting, and the research both needed and under way at several locations, covering effects of contour planting and terracing on decreasing erosion and runoff, increasing soil moisture and fruit production, and other significant criteria, are discussed.—

J. T. Bregger.

13868. BROWN, GORDON G. Yields from young apple trees topworked on Arkansas. Proc. Amer. Soc. Hort. Sci. 36: 141-142. 1938(1939).—Average annual loose-box yields per tree, from interplanted, unworked, and top-worked Newtown, Spitzenberg, Red Spitzenberg (Goodenough strain), Red Spitzenberg (Southern Oregon strain), Delicious, Delicious (Starking), and Ortley were compared during 7-8, 9-11, and 12 yrs. of age. With Newtown, the principal var., yields from unworked and top-worked trees were 2.30-.69; 5.69-5.55 and 10.85-10.7 boxes. The general average for all vars. for the 9-11 year period was, unworked 7.1 and top-worked 8.6 boxes. The data constitute a progress report concerning hardy stock studies.—G. G. Brown.

13869. BUSHNELL, JOHN. Response of four vegetable crops to phosphate fertilizer in southern Ohio. Proc. Amer. Soc. Hort. Sci. 36: 515-517. 1938(1939).—Sweet corn obtained ample P from the native supply in the soil; early cabbage, tomatoes and cucumbers required phosphate fertilizer. Annual application of 60 pounds of P₂O₂ per year for 16 yrs. gave a residual available P sufficient to maintain yields of all 4 crops for 5 yrs.—J. Bushnell.

13870. CHANDLER, F. B. The effect of lime on the

13870. CHANDLER, F. B. The effect of lime on the low-bush blueberry. Proc. Amer. Soc. Hort. Sci. 36: 477. 1938(1939).—One, 2, 3 and 6 tons of lime per acre was applied to blueberry soil in 1931. Part of the plots received a 2d application in 1932 and a few of the plots received a 3d application in 1934. In most cases lime increased the yield of blueberries. With the heavier applications the top inch became slightly alkaline.—F. B. Chandler.

inch became slightly alkaline.—F. B. Chandler.

13871. CHANDLER, W. H. Rolling of leaves on Oriental plum trees, apparently caused by cool summers. Proc. Amer. Soc. Hort. Soc. 36: 259-260. 1 fig. 1938(1939).—In the exceptionally cool summers of Berkeley, California, leaves of some vars. of Prunus salicina and of hybrids between P. silicina and P. simonii, such as Wickson, Kelsey, and Simon, roll upward conspicuously; those of others roll to a less extent while those of others such as El Dorado, Abundance, and Burbank, fail to roll. In many other spp. of Prunus observed leaves of none showed this rolling.—W. H. Chandler.

13872. CLORE, W. J., E. L. OVERHOLSER, and L. B. WOOTON. Plum variety trials in Central Washington. Proc. Amer. Soc. Hort. Sci. 36: 384-388. 1938(1939).—Plum variety trials conducted under irrigated conditions on a fine sandy loam soil in central Washington were started in 1932. On the basis of blossom and harvest dates, resistance to winter injury, and tree-growth response, several of the vars. show promise for planting to extend the harvest and shipping season before and after that of the Italian var. These include: (1) the President, a late European plum of large size and excellent quality; (2) the Santa Rosa, a large medium early, high quality Japanese plum; (3) the Elephant Heart, a large late season, excellent quality Japanese plum; (4) the Beauty, a medium quality, small, early season Japanese plum, and (5) the Imperial, a medium sized, high quality, midseason European plum.—Authors.

13873. COWART, F. F. Root distribution and root and

13873. CÔWART, F. F. Root distribution and root and top growth of young peach trees. Proc. Amer. Soc. Hort. Sci. 36: 145-149. 1938(1939).—Following the 1st and 2d growing seasons, depth and spread of rooting of representative Mikado peach trees were detd. The trees were grown on a medium heavy Cecil sandy loam soil. Peach roots penetrated 30 to 36 inches and attained an average spread of 6 feet, during the 1st growing season. With 1-yr. trees, 82.9% of the total tree roots and 48% of the roots less than 2 mm. in diam. were found within 1 foot of the tree. Roots of 2-yr.-old peach trees penetrated to an average depth of 4½ ft. and attained an average spread of 12 ft. 67% of the total tree roots were found within 1 foot of the tree. About equal weights of roots less than 2 mm. in diam. were found in the various 1-foot circles to a distance of 5 ft. from the tree. However, by far the greatest weight of these small roots, per cubic foot of soil, was found within 1 foot of the tree. Roots of young peach trees seem to have no particular difficulty in penetrating the red and fairly stiff clay subsoil, characteristic of the Cecil soil series.—F. F. Cowart.

13874. CRANDALL, F. K., and T. E. ODLAND. The response of early celery to fertilizer ingredients. *Proc. Amer. Soc. Hort. Sci.* 36: 523-525. 1938(1939).—Early celery was grown on a mineral type of soil with a small application of stable manure supplemented by a green manure crop and fertilizers with varying proportions of N, P, and K. The average yield of celery obtained where the standard 6-8-6 fertilizer was applied was 1073 dozen bunches per acre. An increase of 50% in the amount of N applied resulted in an average increase of 33 dozen bunches per acre. A decrease of 50% in the amt. of N applied reduced the average yield 61 dozen bunches. While P affected the yields much less than N a reduction of 50% in the amt. applied resulted in a decrease in the average yield of 39 dozen bunches per acre. Increasing and decreasing the amount of potash in the standard fertilizer by 50% varied the average yield by 86 and 35 dozen bunches per acre, respectively. The quality factors, crispness and stringiness, did not appear to be affected by the variations in N, P, and K in these tests.—F. K. Crandall.

13875. DEAN, L. A., and J. H. BEAUMONT. Soils and fertilizers in relation to the yield, growth and composition of the coffee tree. Proc. Amer. Soc. Hort. Sci. 36: 28-35. 1938(1939).—In 2 fertilizer expts. in the Kona coffee district of Hawaii, NK and NPK treatments (160 lbs. of each constituent per acre per year) produced significantly higher yields than no-fertilizer, N, or NP treatments in one expt., or NP or PK treatments in the 2d expt. In the latter test ½ N plus PK was as satisfactory as NPK. Regardless of fertilization, extreme annual fluctuations in yield occurred. Growth measurements indicated greater circumference and lateral growth of potash-fertilized trees. Analyses of tree parts indicated that the chief difference in chemical constituents was in the greater percentage of K₂O present in all tree parts of potash-fertilized trees. Soil studies indicated that the K₂O supply in the soil was low even in potash-fertilized plats. Applications of (NH₂)₂SO₄ resulted in a marked increase in soil acidity after 7 years.—K. W. Pierson.

13876. Des JAYASUNDERA, E. S. A note on the cultivation of the cauliflower in the dry zone of Ceylon. *Trop. Agric.* [Ceylon] 91(6): 349-352. 1938.—A note on the culture and varieties. The principal insect pests are the defoliator

Prodenia litura; the sucking bug, Bagrada picta, which attacks leaves and heads; the fly maggot, Agromyza sp. which tunnels the leaf stems; and the caterpillar Crocidolomia binotalis. The only troublesome disease is caused by Bacillus carotovorus.—W. D. Pierce.

13877. EDMOND, J. B., and H. J. SEFICK. A description on certain nutrient deficiency symptoms of the Porto Rico sweetpotato. *Proc. Amer. Soc. Hort. Sci.* 36: 544-549. 1938 (1939).—Sweet potato plants were grown in 2-gallon ovenware jars containing sand and were given the following treatments: complete, minus N, minus P, minus K, minus Ca and minus Mg. The symptoms associated with the deficiency of each respective nutrient are described and data are presented on the amt. of growth made.—Auth. summ.

13878. GARDNER, V. R. Studies in the nature of the pomological variety. I. A hetero-chimeric apple sport and its vegetative progeny. Michigan Agric. Exp. Sta. Tech. Bull. 161. 1-14. 4 pl. 1938.—A detailed description is presented of the fruits of an apple tree almost identical to Northern Spy in vegetative appearance but producing fruit of great diversity in form, season of ripening, and color distribution. Because of its apparent commercial value, scions of the original tree were top-worked into a group of Grimes Golden trees, and the new var. was designated as Graham. As with the parent tree most of the top grafts were more variable in form, color, and time of ripening than the standard vars, but none was as variable as the parent. Types of fruit were found which differed as greatly from one another as do accepted vars. The author believes that the Graham apple is a chimera, either periclinal or mericlinal. The behavior is compared to that of Pelargonium zonale and other inconstant plant forms. Since the diversities are not limited to a single feature, the term heterochimeric is suggested as applicable to the new apple. Several other vars. now commonly grown, especially those which exhibit great variability, may be likewise chimeras.—Courtesy Exp. Sta. Rec.

13879. GREEN, E. C. Cacao cultivation, and its application to the mandated territory of New Guinea. New Guinea Agric. Gaz. 4(4): 2-62. 15 pl., 16 fig. 1938.—This article deals with the possibilities of cacao cultivation in New Guinea, the preliminary clearing of land, drainage, preparation and layout, a discussion of the available cover plants and shade, interplanting with coconuts, selection of var., planting distances (preferably 15 by 15 ft.), windbreaks, planting methods, estate management, rejuvenation, picking and breaking of pods, fermentation of the beans, drying and marketing. The cacao diseases discussed are: Rigidoporus microporus, causing a root disease; brown root disease, caused by Fomes noxius, red root disease caused by Sphaerostilbe repens, wet rot caused by Ganoderma pseudoferreum, collar crack caused by Armillaria mellea, die back and pod rot caused by Diplodia theobromae, pink disease caused by Corticium salmonicolor, red rust caused by Cephaleuros mycoidea, pod rot caused by Phytophthora palmivora. A bibliography of 20 titles, and a tabulation of rainfall and ave. number of wet days at 30 stations, are given.—W. D. Pierce.

13880. HALLER, MARK H. Storage of strawberry plants. Proc. Amer. Soc. Hort. Sci. 36: 466-472. 1938(1939).—Strawberry plants (principally Howard-17 var.) were stored for various periods during one winter at 17°, 30°, 32°, and 36° F and planted at intervals during spring. Three months at 17° killed practically all plants. Growth of plants from 30° to 36° storage was generally superior to that of field plants transplanted when the storage plants were set out. Plants from 36° grew as well as and those from 30° somewhat better than those of 32°, but 32° storage is recommended because of the fresher appearance of the plants on removal from storage. Satisfactory growth was obtained with plants stored as long as 6 months at 32°. Plants could be stored either "in the rough" or packed in crates with moist sphagnum moss around the roots. Trimming of the leaves at the time of storage was of no benefit. Fumigation with methyl bromide at the time of storage caused severe injury; fumigation just previous to planting did not.—M. H. Haller.

13881. HARDING, PAUL L., J. R. WINSTON, and D. F. FISHER. Seasonal changes in the ascorbic acid content

of the juice of Florida oranges. Proc. Amer. Soc. Hort. Sci. 36: 358-370. 1938(1939).—Early and midseason vars. have as high ascorbic acid content as late Valencia oranges, and no correlation was found between the ascorbic acid-content of orange juice and quality, as judged by taste. In Valencia oranges ascorbic acid gradually decreased with ripening. The highest values were associated with immature fruit, and the lowest with senescent fruit. In early and midseason oranges, trends of decreasing values were not so pronounced and not always consistent. Usually larger quantities of ascorbic acid were found when oranges were grown on sour orange, grapefruit, sweet orange, and Cleopatra stocks than when grown on rough lemon stock. Significantly greater amts. of ascorbic acid were found in oranges picked from outside branches which were well exposed to sunlight; less was found in fruit from inside shaded trees.—P. L. Harding.

13882. HARLEY, C. P. Some associated factors in the development of water core. Proc. Amer. Soc. Hort. Sci. 36: 435-439. 1938(1939).—In addition to the generally recognized conclusion that water core in apples is primarily caused by high fruit temps., evidence was secured which indicated that high leaf-fruit ratios as obtained by leaf and fruit adjustments on ringed branches, and soil N applications to N-deficient trees, materially increased the percentage of fruits with water core. The higher percentages of water core in the nitrated plots were probably due to increased efficiency of leaves to synthesize and transport carbohydrates to the fruit. Abundance of soil moisture appeared in no way to be related to the prevalence of water core. In many instances the highest percentages of apples with water core were found in the "dry" plots.—C. P. Harley.

13883. HARTMAN, JOHN D., and EDWARD C. STAIR. Soil acidity for greenhouse lettuce and tomatoes. Proc. Amer. Soc. Hort. Sci. 36: 715-719. 1938(1939).—Soil acidities in most of the vegetable greenhouses near Indianapolis range between pH 7 and 8.2. The principal crops grown are leaf lettuce and tomatoes. Careful growers can produce good crops on these soils, but it has been noticed on some soils that high alkalinity decreases yields of some crops and especially of lettuce. It was thought that better crops might be grown if the soil were made more acid. An expt. was set up in the greenhouses at Purdue Univ. to test this possibility. Plots 16 by 5.6 feet were laid out on ground beds and the acidity was increased by use of aluminum sulphate and sulphur. Acidity ranged from 7.4 for the check to 5.9 for the high-sulphur plots. Yields from these plots showed a slight decrease on the more acid plots,

but there were no significant differences.—E. C. Stair.

13884. HAVIS, LEON. Influence of certain cultural systems upon root distribution of black raspberries. Proc. Amer. Soc. Hort. Sci. 36: 478-480. 1938(1939).—In studies of the root distribution of Logan black raspberries under straw mulch and cultivation treatments at Wooster, Ohio, it was found that the roots extended to a depth of 4 to 5 feet under both treatments. There was no difference in depth nor lateral distribution of the roots under mulch and cultivation. They were, however, straighter and less branched under the mulch, and this resulted in a fewer total number of roots under this treatment. Under both treatments the roots were most numerous at 18 to 24 inches from the plant. The sharp reduction in number of roots of all sizes at about 3 feet from the plants suggests that the rows might well be 6 to 7 feet apart in soils similar to the Wooster silt loam if economy of space is sufficiently important.—L. Havis.

13885. HITZ, C. W., and I. C. HAUT. Effect of certain waxing treatments at time of harvest upon the subsequent storage quality of Grimes Golden and Golden Delicious apples. Proc. Amer. Soc. Hort. Sci. 36: 440-448. 1938(1939).

—Coating Grimes Golden and Golden Delicious apples with Brytene water-miscible wax immediately after picking and following a ripening period of 1, 2 and 3 weeks at 60°F significantly reduced loss of weight and shriveling in storage. Delaying the waxing treatment one or more weeks at the pre-ripening temp. precluded the development of superficial storage scald which developed on those samples waxed immediately. The ground color of the waxed samples on removal from storage was proportional to the development at time samples were placed in storage.—C. W. Hitz.

13886. HODGSON, ROBERT W. Girdling to reduce fruitdrop in the Hachiya persimmon. Proc. Amer. Soc. Hort. Sci. 36: 405-409. 1938(1939).—Girdling young, unpollinated Hachiya persimmon (Diospyros kaki) trees, where crops are the result of parthenocarpic fruit development, (1) materially reduced fruit-drop and increased yield for the current season; (2) increased the yield for the following season, partly the result of greater fruit-bud formation; (3) 2 increased crops, caused by girdling, resulted in decreased yield the season thereafter; (4) the period May 15–June 15 was the safest and most effective for treatment; (5) increased yield was at the expense of fruit size and commercial quality.—R. W. Hodgson.

13887. KAHAWITA, R. Citrus culture in the dry zone. Duty of water and irrigation practice. 1, 2. Trop. Agric. [Ceylon] 91(5): 266-273. 5 fig.; 274-279. 7 fig. 1938.—Discussion of the duty of water, and the methods of application, with descriptions of construction of cheap structures and implements necessary for distribution of the water.—W. D. Pierce.

13888. KELLEY, VICTOR W. Relation of leaf form to transpiration rate and drouth resistance in some deciduous fruits. Proc. Amer. Soc. Hort. Sci. 36: 210-215. 1 fig. 1938 (1939).—The relation of leaf form to transpiration rate and drouth resistance was studied with 21 spp. of deciduous fruits. Those spp. which transpired very slowly had narrow leaves; those having broad leaves transpired much more rapidly per sq. in. of leaf surface. Spp. with narrow leaves are considered drouth resistant, those with broader leaves in proportion to length are considered non-resistant to drouth. Transpiration rate per unit area and leaf form as it affects total area are important factors in conserving or exhausting the supply of soil moisture. In this study, narrowness of leaf and low rate per unit area are usually combined in the same species.—V. W. Kelley.

13889. KELLY, E. CAULFIELD. Suggestions for the improvement of New Guinea copra. The employment of sulphur dioxide in the curing of copra. New Guinea Agric. Gaz. 4(4): 63-66. 1938.—Freshly cut coconut meat, treated by SO₂, may be successfully dried under cover, even without exposure to the sun or artificial heat in 2 weeks, and no mold action, stain or discoloration will take place. Sulphured copra, properly dried, has a lighter appearance than the whitest sun-dried copra. The moisture content is 5%, and the free fatty acid content less than 1%.—W. D. Pierce.

the free fatty acid content less than 1%.—W. D. Pierce.

13890. KING, J. R., and C. O. HESSE. Pollen longevity studies with deciduous fruits. Proc. Amer. Soc. Hort. Sci.
36: 310-313. 1938(1939).—The present study is confined to the interrelation of temp. and humidity to pollen longevity. 19 pollens were used—13 from Prunus, 3 from Pyrus, 2 from Cydonia, and 1 from Pistacia. The vials of pollen were stored in tightly sealed fruit jars. Humidities of 0%, 25% and 50% at 32°, 36°, 45° F and room temp. were maintained, with a sample of each pollen at 10° F and no humidity regulation. Samples at room conditions were kept for controls. To date, records on percentage of germination have been taken at 5 intervals, extending over a period of 550 days. Culturing for the first 3 counts was done in sucrose soln., while sucrose agar was used for the last 2 counts. In general, the optimum storage conditions for many of the pollens were close to the conditions obtained at 36° and 25% relative humidity. 25% relative humidity was, on the average, definitely the most favorable humidity while the optimum temp for an average of all of the pollen used seemed to lie around 36° F.—Authors.

13891. LATIMER, L. P. Response of Howard 17 strawberry to sodium salts. Proc. Amer. Soc. Hort. Sci. 36: 449-454. 1938(1939).—Field expts. on Gloucester stony loam showed that NaNO₃, NaH₂PO₄ and Na₂SO₄ were each toxic to plants when applied to the soil between July 25 and Aug. 19, just as runner plants were beginning to form in a bed planted in May of the same year. These salts were applied at the rate of 108 lbs. per acre. In plants thus fertilized, leaf area, petiole length and yield of berries were markedly diminished the following year compared with control plots receiving no fertilizer. That Na was the cause of injury is indicated by the fact that normal results were obtained when NH₄* and Ca*+ were substituted for Na* in the above salts. When these minerals were applied 10 to 14 days before bloom in another series of plots, yield was reduced with

NaNO₃, Na₂SO₄, NH₄NO₃, NH₄H₂PO₄, (NH₄)₂SO₄ and CaNO₃, and petiole length was very significantly increased over that in control plots wherever N was included. The same was found also with relation to average leaf weight except with NaNO₃. Crop reduction following application of N before bloom was apparently due to excessive foliage development.—L. P. Latimer.

13892. LUMSDEN, D. VICTOR. The influence of storage temperatures on the forcing of King Alfred narcissus bulbs. Proc. Amer. Soc. Hort. Sci. 36: 786-790. 1938(1939).—Bulbs of Narcissus pseudonarcissus var. King Alfred were subjected to 28 combinations of temps. during summer storage. In the fall they were planted, rooted, and forced in a greenhouse. The influences of the storage temps, upon the greenhouse. The influences of the storage temps, upon the time of bloom, flower quantity, and quality were studied. A midseason storage at 32° F gave a higher yield of flowers than either 40° or 50° F for the same period. A late storage period of 60° F was more effective in accelerating flowering than either 70° or 80° F. Check bulbs from common storage given 1 month storage at 50° F just prior to planting were equal to or better than bulbs from any of the controlled

temp. combinations used.—D. V. Lumsden.

13893. LUTZ, J. M. Evaluating quality changes in certain vegetables after harvesting. Proc. Amer. Soc. Hort.

Sci. 36: 754-759. 1938(1939).—2 methods of evaluating quality changes in vegetables after harvesting-1) by chemical and physical determinations and 2) by freezing the products (after proper preparatory treatment) and storing at freezing temps. until they are cooked, when comparisons could be made between samples at different stages of maturity or after different treatments—were compared. Method (1) cannot always be relied upon to give accurate information on characteristics such as color, texture, and flavor of certain vegetables after cooking as influenced by after-harvest treatments of the products. Method (2) constitutes a desirable supplement to (1) since it furnishes a means of demonstrating the practical significance, from the standpoint of the consumer, of changes detected by precise analytical methods.—J. M. Lutz.

13894. McMUNN, R. L. An evaluation of ninety-six apple varieties at the 21-year period under Illinois conditions. Proc. Amer. Soc. Hort. Sci. 36: 379-383. 1938(1939).— Data are presented in tabular form on age of initial bearing,

total yield for the 21-year period, and susceptibility to fire blight and winter injury.—R. L. McMunn.

13895. MAGOON, C. A., A. T. MYERS, I. W. DIX, and B. C. BRUNSTETTER. A spectrographic study of Concord and Ontario grape varieties. Proc. Amer. Soc. Hort. Sci. 36: 485-491. 1938(1939).—Significant differences were found in the mineral content of young growing leaves, particularly with respect to Mg, P and Cu. Ontario was higher in P and Cu and Concord in Mg. Only once was a significant difference noted in the mineral content of the nodal tissues of the 2 vars., this being a slightly higher Mn content of the Concord var. The mineral content of young growing leaves was higher than of nodal tissues in Mg, P, Cu, K, Mn, Al, Fe, and B while Ca was present in about equal amts. Differential effects of cornstalk mulch versus clean cultivation and of 5-8-5 complete fertilizer versus NaNO. applications, under the conditions of the expt., were not clearly defined. The report of findings is based on 2,640

separate determinations.—C. A. Magoon.
13896. MOLEGODE, W. Cardamoms. 1, 2. Trop. Agric.
[Ceylon] 91(6): 321-332. 7 fig. 1938.—Three vars. of
Elettaria cardamomum grow in Ceylon, 1 native and 2 cultivated.* Propagation by seed is recommended, raising the seedlings in boxes and later transplanting. They begin yielding seed in the 2d or 3d year, and at higher elevations good crops can be expected for 10 years. At the maximum stage the production may reach 1500 lbs. of green cardamoms per acre. The fruit is picked before fully ripe. Green curing by 2 methods is described, drying in heated chamber, and over an open charcoal fire in a closed chamber.—W. D.

13897. MOORE, D. C., and W. W. ALDRICH. Leaf and fruit growth of the date in relation to moisture in a saline soil. Proc. Amer. Soc. Hort. Sci. 36: 216-222. 1938(1939).—One year's study of date-palm responses to soil moisture indicated when during the summer average soil moisture in a portion of the root zone was depleted to or below the permanent wilting percentage, the rate of leaf elongation was reduced; following the replenishment of depleted soil moisture by irrigation, the rate of leaf elongation was usually increased. The apparent sensitivity of leaf growth to amt. of soil moisture suggests the rate of leaf growth may be used as an index of water deficits in the palm. Water deficits in the palm, so indicated, resulted in reduced rate of increase in fresh weight of fruit. While the fresh weight of the fruit was at its maximum, or was decreasing just before tip softening, the rate of dry matter increase in the flesh was at a maximum.—W. W. Aldrich.

13898. MORRIS, L. L., and HANS PLATENIUS. Low

temperature injury to certain vegetables after harvest. Proc. Amer. Soc. Hort. Sci. 36: 609-613. 3 fig. 1938(1939).— Low temp. injury (pitting) was observed in cucumbers, peppers, watermelons, snap beans, lima beans, eggplants and summer squash. The injury may occur within a temp. range of 32° to 60° F and the severity of pitting is inversely proportional to the storage temp. At any one temp. pitting was much more severe at a low as compared with a high relative humidity. The ultimate cause of pitting is a desiccation of the cells in the epidermis which were injured as a result of exposure to relatively low temps.—Authors.

13899. MORTENSEN, E. Nursery tests with grape rootstocks. Proc. Amer. Soc. Hort. Sci. 36: 153-157. 1938(1939),-Rooting tests with cuttings and cutting grafts using stocks resistant to Phymatotrichum omnivorum are reported for Black Muscat, Monukka, Sultanina and Sultanina Rosea for the years 1935-1938. Ten or more grafts were made with each combination using the ordinary whip graft. Dog Ridge, La Pryor and Champanel were the most promising stocks. Black Muscat gave best percentages of survival with La Pryor, Monukka with Dog Ridge, Sultanina with La Pryor No. 2, and Sultanina Rosea with Champanel.—E. Mortensen.

13900. MURNEEK, A. E. Further results on the influence of branch ringing on fruit set and size. Proc. Amer. Soc. Hort. Sci. 36: 398-400. 1938(1939).—Ringing of branches of 3 vars. of apples increased the fruit set 30-90% and the size of apples 5-18%.—A. E. Murneek.

13901. NEFF, M. S. Problems in the storage of cut

carnations. Plant Physiol. 14(2): 271-284. 4 fig. 1939. Carnations stored without being placed in water were comparable, in keeping quality and carbohydrate reserves, with fresh carnations. Carnations stored with the stems in water were inferior in keeping quality and low in carbohydrates. Low temp. and high humidity were important storage

factors.—M. S. Neff.

13902. NETTLES, VICTOR F. Results from three methods of applying fertilizer to certain vegetables. Proc. Amer. Soc. Hort. Sci. 36: 505-508. 1938(1939).—Fertilizer was applied broadcast in the furrow row and in bands 2 inches to the side of the plants. No significant differences were obtained in the yield of peppers, tomatoes and lettuce from the 3 methods. Each of the 3 methods of application gave the best yield of potatoes from 3 separate expits on different soil types. The yield of snap beans was highest when the fertilizer was placed in the furrow row and cucumber yields were significantly increased by application of fertilizer in bands to the side. Root growth of cucumbers, beans, potatoes and lettuce was found massed in the region of fertilizer conc. when the plants were reaching maturity. V. F. Nettles.

13903. PARTRIDGE, N. L. A method by which trees may be grown with their roots in two soils. Proc. Amer. Soc. Hort. Sci. 36: 77-80. 1 fig. 1938(1939).—A description is given of the construction of paired boxes of galvanized iron in which dwarf apple trees were grown, set on the

dividing partition with half of the roots in each box of the pair. Soil, moisture supply and nutrient supply were then varied between the paired containers and the results on the tree observed.—N. L. Partridge.

13904. PROEBSTING, E. L., and H. E. JACOB. Some effects of winery distillery waste on soil and plants. Proc. Amer. Soc. Hort. Sci. 36: 69-73. 1938(1939).—Trees and wines in soil receiving applications of desclosholized wines. vines in soil receiving applications of de-alcoholized wine were killed. Greenhouse trials with sunflowers showed no initial toxicity, but the development of it in the soil. Toxic cones, of ferrous iron and of acetate were demonstrated. Soil leached with this waste in the fall of 1937 would grow normal plants in the surface soil by the spring of 1938, but

required a year to recover at a depth of 3-4 feet. Leaching of considerable replaceable Ca and Mg from the surface

soil was shown.—E. L. Proebsting.

13905. ROMSHE, F. A. Growth, production, and fruit quality of tomatoes grown under cloth. Proc. Amer. Soc. Hort. Sci. 36: 692-694, 1938(1939).—Pruned and staked tomatoes enclosed by a cloth house were grown in comparison to pruned and staked, and unpruned and unstaked plants. The staked plants were spaced 2 × 3 feet and the plants. The started plants were spaced 2×3 feet and the unstaked were spaced 4×4 feet. Plots were 18×55 feet for each treatment. Cloth shade increased the number of flowers developed per cluster and the percentage of flowers which set fruit. Pruned and staked plants had a smaller stem diam., but greater length of internodes and total height when shaded. A significantly larger number of fruits and greater total weight was produced by the shaded plants. Sunscald and blossom-end rot were prevented by shading.— F. A. Romshe.

13906. SCHOONOVER, WARREN R., F. A. BROOKS, and H. B. WALKER. Protection of orchards against frost. California Agric. Extension Exp. Sta. Circ. 111, 1-70, 12 fig. 1939.—This circular is largely a revision of Extension Circular 40, "Frost Protection in California Orchards," and supersedes it. New data are included relative to atmospheric conditions on frosty nights and radiation losses, and also on fuel storage and distribution. The rest of the circular describes the routine practices in orchard heating.-W. R.

13907. SHAW, J. K. Abnormal behavior of newly set Oldenburg buds. Proc. Amer. Soc. Hort. Sci. 36: 126-128. 2 fig. 1938(1939).—Buds cut from 25-year-old off-year Oldenburg apple trees were inserted into 3 Malling clonal stocks in 1937. Of about 150 buds, only 30% grew normally. There were all sorts of abnormal flower clusters. The flowers showed various intergrades of flower parts and leafy growths. Pedicels were usually elongated and flower parts suppressed or increased in number and size. Most of the buds finally grew into normal trees originating from a lateral bud on the new growth. No similar abnormalities appeared on the parent trees but there were many dormant buds on the previous year's growth. Other vars. in the same nursery grew normally.—J. K. Shaw.

13908. SHAW, J. K. Foundations. Proc. Amer. Soc. Hort. Sci. 36: 845-849. 1938(1939).—Presidential address, discussing the history of horticulture in the U.S., with comments on many of the founders of American horticulture.—J. K. Shaw.

13909. SMITH, C. L. Three years results of thinning the stand as compared with pruning thickly planted pecan trees. Proc. Amer. Soc. Hort. Sci. 36: 339-346. 2 fig. 1938 (1939).—Twelve-yr.-old pecan trees of the Burkett and Texas Prolific vars. were pruned in each of 3 successive yrs. so as to reduce the tops by about $\frac{1}{2}$ of the original size. The Burkett trees stood $\frac{27}{27}$ feet on squares; the pruned Texas Prolific trees stood $\frac{18}{27}$ 18 feet. In other comparable blocks Burkett and Texas Prolific trees were thinned to 45×45 feet and 30×40 feet respectively, and were not pruned. The pruned trees yielded twice as many nuts per acre as unpruned thinned trees, and the foliage conditions were much better on the closely planted pruned trees than on unpruned trees that were more widely spaced. The better foliage condition tended to prevent alternate-year bearing which is so common in the pecan.—C. L. Smith.

13910. SMITH, ORA, and L. B. NASH. Relation of mineral nutrition to chemical composition and cooking quality of potatoes. *Proc. Amer. Soc. Hort. Sci.* 36: 597-600. 1938(1939).—Potatoes were grown in pure sand cultures with complete nutrient soln. and solns. low in K, N, Mn, Cu, Ca, B, Mg and Fe. In most instances the deficiency of a minor element caused increases in total sugars, starch, tyrosine and tryptophane. Mn deficiency caused reductions in total sugars and starch and increase in tyrosine. Cooking tests of these tubers as a whole do not show any consistent differences. The only darkening, however, was in a sample grown in a low-K culture. The % of starch and the proteinstarch ratio apparently do not affect the mealiness of the potatoes.—O. Smith.

13911. SOUTHWICK, LAWRENCE, and J. K. SHAW. Further notes on the Malling clonal stocks in relation to McIntosh and Wealthy. Proc. Amer. Soc. Hort. Sci. 36:

133-137. 1938(1939).—Ten-year performance records of Mc-Intosh and Wealthy apple trees propagated on their own roots, French crab seedlings, and certain Malling clonal stocks are discussed on the basis of growth, yield, precosity, and variability. Malling XII and XVI promoted the greatest vegetative growth and Malling XVI was outstanding in promoting yield. The seedling rooted trees assumed mean positions in the size and yield computations. Of the semi-dwarfing stocks, Malling IV and I were superior. The very dwarfing stocks performed unsatisfactorily. Early heavy bearing of these vars, was notable particularly with Malling IV and delayed precocity with Malling XV. Growth rates were affected by cropping. Variability studies indicated very little benefit in establishing orchard uniformity through the use of clonal or vegetatively propagated trees.—L. Southwick.

13912. SOUTHWICK. LAWRENCE. Relation of seeds to pre-harvest McIntosh drop. Proc. Amer. Soc. Hort. Sci. 36: 410-412. 1938(1939).—A study was made of the variable dropping behavior due to natural abscission of Mc-Intosh apples just preceding and during the usual harvest period. A significant correlation was found indicating some association between fruit-seed number and time of fruit drop. Average seed count in fruit from different trees varied, but with any one tree the few-seeded apples tended to drop sooner than those with a better complement of plump seeds.—L. Southwick.

13913. STOKER, F. Primula clarkei Watt. Jour. Roy. Hort. Soc. 63(10): 485-486. 4 pl. 1938.

13914. TROTTER, ALLEN R., and ALBERT E. GRIF-FITHS. Observations on the effect of shade on vegetables. Proc. Amer. Soc. Hort. Sci. 36: 550-554, 1938 (1939), -Shade was provided by heavy tobacco cloth and 3 kinds and 6 vars. of vegetables were planted under shade and duplicated outside. Light intensity was significantly lower and relative humidity and percentage of soil moisture were significantly higher under shade, but air and soil temps. were not significantly different under the 2 treatments. Air and soil temps, were more uniform under cloth. All plants under

shade were of better quality.—A. R. Trotter.

13915. WARDLAW, C. W. Storage investigations with
Trinidad avocados, 1938. Trop. Agric. [Trinidad] 16(2): 28-30. 1939.—Observations of 5 vars. kept in storage at 4 combinations of temp. and relative humidity. A close relationship was established between the onset of chilling injury and ripening processes. Fungal wastage was slight and chiefly due to Colletotrichum gloeosporioides.—W. D. Pierce.

13916. WEBER, ALBERT L., and HARRY C. McLEAN. Copper content of some New Jersey grown tomatoes. Proc. Amer. Soc. Hort. Sci. 36: 705-707. 1938(1939).—Samples of New Jersey-grown tomatoes contained 9.8 to 22.3 p.p.m. of Cu (on dry wt. basis) depending upon the ripeness of the tomato, and the type and pH of the soil upon which they were grown. A few analyses of processed tomato products are given. It appears that the Cu may plate out when

packed in unlacquered cans.-Authors. 13917. WHARTON, M. F., and W. A. FRAZIER. Effect of certain storage treatments on field and laboratory germination of seeds of Imperial 152 and Imperial 615 lettuce. Proc. Amer. Soc. Hort. Sci. 36: 680-686. 1938(1939).—High-temp. storage (75° F and above) of "new" seed of Imperial 152 and Imperial 615 lettuce gave earlier satisfactory field and laboratory germination than low-temp. storage (40° F). Imperial 615 gave an earlier high germination percentage than did Imperial 152. High-temp, storage of spring harvested seed appears advisable when the seeds are to be planted during the warm weather of fall in Salt River Valley.— Authors.

13918. WOOD, R. C. Eucalyptus deglupta Blume (E. naudiniana F. V. M.) Kamarere. Trop. Agric. [Trinidad] 15(4): 82-83. 2 fig. 1938.—Notes on the planting of kamarere introduced from New Britain into Trinidad in 1927, with photographs of 9-year-old tree, and a planting of 2-year-olds .- W. D. Pierce.

13919. WRIGHT, N. Yields of budded rubber in commercial tapping. India-rubber Jour. 97(3): 89-92. 1939.

13920. YEAGER, A. F., and D. H. SCOTT. Studies of mature asparagus plantings with special reference to sex

survival and rooting habits. Proc. Amer. Soc. Hort. Sci. 36: 513-514. 1938(1939).—Asparagus plantings made at Fargo, North Dakota, showed 2.5 staminate crowns for each pistillate crown in a 35-yr.-old bed. The ratio in a 15-yr.-old bed was 1.4 staminate to one pistillate. In the 35-yr.-old bed the crowns were often 5 feet in diam. Their depth below the surface averaged 5 inches. Root penetration was much deeper than the average tree on the same soil.—Authors.

FORESTRY

W. N. SPARHAWK, Editor

(See also the section Economic Entomology—Forest and Shade Trees; and Entries 12479, 12566, 12590, 12594, 13765, 13767, 13770, 13772, 13774, 13785, 13842, 13919, 13980, 14025, 14039, 14043, 14048, 14073, 14089, 14096, 14100, 14125, 14126, 14131, 14132, 14135, 14137)

13921. AKERHIELM, LARS. Medeltidstallar. [Pine trees dating from the Middle Ages.] Skogen 25(23): 420-424.6 fig. -The oldest living trees in Sweden are 300-550-yr.-old pines (*Pinus silvestris*) in the northern part of the country. These trees are thin in crowns, bear only male flowers as a rule, but are very persistent and efficient in resisting natural calamities.—G. S. Perry.

13922. BASSI, VINCENZO. L'attuale tecnica dei rimboschimenti in Sardegna. [Technique of reforestation in Sardinia.] Riv. Forest. Ital. 1(2): 15-26. 7 fig. 1939.—During the 150 yrs. preceding 1923 the forests of Sardinia were reduced from 20% to 8% of the land area. Since 1923 considerable reforestation has been done. Three types of project are involved: mountain basins; littoral sands, fixed or shifting; and shelterbelts on the plains. Methods of doing the work are descr. In general, direct seeding is preferred to planting.—W. N. Sparhawk.

13923. BEDELL, GEORGE. Forest management on the

Duck Mountain Forest Reserve. Forest. Chron. 15(2): 81-84. 1939.—Methods of management in a 1,300-sq. mi. Mani-

toba spruce forest are descr.—W. N. Sparhawk.

13924. BUCHHOLZ, E. Die Forst- und Holzwirtschaft
Lettlands. Wiener Allg. Forst- u. Jagdztg. 57(17): 119-121.

13925. CANDY, R. H. Discussion on the reproduction and development of white pine. Forest. Chron. 15(2): 88-92. 1939.—It is believed that Pinus strobus is a fire-type species, i.e., that it reproduces best following fire, provided seedtrees are present, and that it does best in association with other fire-type spp. such as aspen, white birch, and jack pine. It does not reproduce under the old stand. Sound forest practice would confine efforts to bring about natural regeneration of white pine to light soils where competition of shade-tolerant hardwoods (in the south) and spruce and balsam (in the north) is not serious.—W. N. Sparhawk.

13926. CHAPMAN, R. A. Errors involved in determining tree volumes by the planimeter method. Jour. Forest. 36 (1): 50-52. 1 fig. 1938.—Individual biases of planimeter operators produce variations in planimeter readings regardless of the scale used. The bias tends to vary inversely with the smoothness of the plotted curve. It is recommended that curves be plotted on the largest possible scale and that

several people planimeter each figure.—A. G. Hall. 13927. CHAPMAN, R. A. The effect of origin of stand on the site index of longleaf pine. Jour. Forest. 36(1): 75-76. 1 fig. 1938.—Site indexes vary significantly between natural and old-field stands, indicating that inaccuracies will appear in yield tables based on combined data from

stands of different origins.-A. G. Hall.

13928. CUSIN. Les sapinières des Hautes-Alpes. Rev. Eaux et Forêts 77(2): 120-129; (3): 213-224. 1939.—The distribution of Abies pectinata (A. alba) in the department Hautes-Alpes is outlined. Regeneration is poor under spruce or old regular stands of fir, and where there is a spruce or old regular stands of irr, and where there is a dense broadleaf understory; it is good in small openings such as occur in selection forest. In some localities it is receding, in others it is spreading. Height growth is fairly rapid for about 150 yrs. in the fir zone (1,200-1,700 m. altitude), and diam. growth holds up well throughout the life of the tree (200-300 yrs.). Fir forests are managed under the selection system with network proposation. The size is the selection system, with natural regeneration. The aim is to produce trees of 60-65 cm. diam. (about 180 yrs. old). The cutting cycle is 15-25 yrs., ave. about 18 yrs. There is now an excess of old trees. Suggested measures for improvement in the cutting cycle is 15-25 yrs. provement include reduction in size of maturity to 40-50 em., and of the cutting cycle to 10-12 yrs. on good sites, and an increase in the annual cut.—W. N. Sparhawk.

13929. DOWNS, ALBERT A. Glaze damage in the birchbeech-maple-hemlock type of Pennsylvania and New York. Jour. Forest. 36(1): 63-70. 2 fig. 1938.—A glaze storm, Mar. 17-19, 1936, covered 6,000,000 acres of northern hardwoods. In N. W. Pennsylvania severe damage occurred to 18.6% of vol. of young growth, 39.7% of 2d growth, and 68.4% of old growth. Dominant trees were damaged more than those in lower crown classes. Severe damage ranged from 41% of Prunus serotina to 4.8% of Tsuga canadensis. Stand composition changed to include greater percentages of glazetolerant spp. A 20% decrease in stand density resulted. Damage increased with increasing altitude and latitude, but the presence of large bodies of water tended to reduce their effects. N. and E. slopes suffered heavier damage than did S. and W. slopes. Future losses through decreased vol. and

quality growth are predicted—A. G. Hall.

13930. EISLER, H. P. Thinning operations in lodgepole pine. Forest. Chron. 15(2): 85-87. 1939.—The Cypress Hills Provincial Forest in S. W. Saskatchewan consists largely of young Pinus murrayana that has partially restocked a burn of 1884. Thinning operations have been carried on since 1924. Experimental thinning in 1937-1938 left 1,510 living trees (264 dominants) per acre in stands that had been fairly open, and 3540 trees (336 dominants) in dense stands.

—W. N. Sparhawk.

13931. ERIKSSON, HERMAN. Skogbruk i Skottland och dess förutsättningar. [Forestry in Scotland and its limitations.] Skogen 25(24): 437-443. 10 fig. 1938.—A Swedish forester describes Scotch forestry in some detail, emphasizing the success there with larch, the favorable influence of heavy rainfall, equable temps., and a good market for forest products.—G. S. Perry.

13932. FABRICIUS, L. Forstliche Versuche XXII. Kalkdüngungsversuch II. Forstwiss. Centralbl. 61(8): 229-237. 4 fig. 1939.—Pine, spruce, and larch seed were sown in 1929 on limed and unlimed plots on a clean-burned area in the so. Nuremberg forest district. Plots were treated with burnt lime (92% CaO) and CaCO₂ (56% CaO) at the rate of 2, 3, 4, and 5 tons per ha. The plants were measured in 1934 and 1937. Liming had little effect on pine. Application of 2-3 tons per ha. stimulated growth of spruce and larch; greater quantities of carbonate were not appreciably more effective with spruce, but greater applications of burnt lime resulted in greater growth. The greatest growth of larch was on the most heavily limed plots. It is concluded that moderate application of lime will insure maintenance of spruce and larch in mixture with pine on soils where they would otherwise be crowded out.—W. N. Sparhawk. 13933. GATHY, H. Recensement general de l'agriculture,

au 31 decembre 1929. Bull. Soc. Centr. Forest. Belgique 46(5/6): 230-253. 1939.—Statistics on distribution, extent,

composition, and ownership of forests in Belgium, and the value of their products.—W. N. Sparhawk.

13934. GONGGRIJP, L. Voorloopige stamtafel van Acacia decurrens var. mollis. [Preliminary volume table for A. decurrens v. mollis.] [With Eng. summ.] Tectona 32(3): 191-218. 6 fig. 1939.—Tables based on 468 trees are presented and methods of constructing them are descr. A table of bark yield is also given.—W. N. Sparhawk.

13935. GRIFFITH, A. L. An investigation into the best

date of stump planting teak (Tectona grandis) at Begur (Wynaad Division), Dhoni (Palghat Division) and Topslip (South Coimbatore Division). Indian Forest. Rec. Silviculture 3(2): 17-46. Frontispiece, 1 pl. 1938.—1-yr.-old teak stumps, 0.3-0.8 inches in diam., were planted with 6×6 foot spacing in crowbar holes at 3 localities in Madras, at fortnightly intervals from Mar. 15 to June 15, 1932-1936. Begur

(2,000 feet elevation) has 67 inches annual rainfall, most of which comes from the s. w. monsoon in June-Aug., with showers in Apr.-May. Dhoni (350 feet) has 111 inches of rain, similarly distrib., and Topslip (2,000 feet) gets 67 inches, of which ½ comes in June-Aug. and ½ in the n. e. monsoon of Oct.-Dec. Results of the plantings indicate that for this type of climate teak stump-planted 4-6 weeks before the break of the monsoon survives better than that planted in June and grows 40-100% taller in the 1st season. The in-

creased height growth gives the teak an advantage in competition with weeds.—W. N. Sparhawk.

13936. GUDDEN, F. Bericht über einen Murraykiefern-Herkunftsversuch im Lehrwald Wildtal des staatlichen Forstamts Freiburg i. Br. Allg. Forst- u. Jagd-Ztg. 115(5): 162-164. 1939.—Pinus murrayana transplants grown from seed collected in 3 localities in western Washington were planted in the Freiburg forest (1931-1933) at 300-400 m. altitude, on gneiss soil. When measured in 1937, the growth of 2 lots (from localities with 2 and 3 months frost-free periods) had been faster than that of nearby P. silvestris and of lodgepole pine in Bavarian expts. The 3rd lot (origin uncertain) grew more slowly. In contrast to P. silvestris, the lodgepole seedlings were not damaged by snow.-W. N.

Sparhawk.

13937. HAO, KIN-SHEN. Über Saatgutprüfung auf biochemischem Wege. Zeitschr. Forst- u. Jagdw. 71(3): 141-156; (4): 187-204; (5): 249-269. 1939.—Embryos from several lots of seed of Pinus silvestris, Picea abies, Pseudotsuga taxifolia, and Abies alba were separated from the seed after soaking in water for 24 hours, and were then soaked in a 0.1% indigo-carmine soln. for 1 hr. They were then classified into 5 groups, according to the extent to which they stained blue. Those that remained white or that had only a small blue spot at the root end were considered viable. The % of viability determined in this manner checked closely in nearly all instances with the results of germination tests. Practically the same result was obtained by placing the seed in a germination bed for 4 days (pine) to 10 days (spruce) and adding to the actual germination within those periods the ungerminated seed that remained white after indigo-carmine treatment. pH value of the solution did not affect the reaction to the dye. Viability of Douglas fir seed, which requires 2 months for ordinary germination tests, was determined with equal accuracy by the indigo-carmine treatment (0.05% soln.) after lying in the germination bed 7-21 days. This method gives more definite results and is quicker than the selenite method, and has the further advantage that the dye is not poisonous. The results of a large number of tests with the sodium selenite method are also presented and discussed.—W. N. Sparhawk.

13938. HELLINGA, G. Voorloopige opstandstafel voor Acacia decurrens var. mollis Lindl. [Preliminary yield table for A. decurrens.] [With Eng. summ.] Tectona 32(4/5): 277-289. 3 fig. 1939.—A. decurrens has been widely planted in Java during the last 5 yrs. The yield table is based on 62 plots, mostly in w. Java. Max. mean annual increment is reached in 6 yrs. on the best sites and 7 yrs. on the poorest, with yields of 22 and 16.3 cu. m. per ha. per annum, respectively.—W. N. Sparhawk.

13939. HESKE, FRANZ. Der tropische Wald als Rohstoffquelle. Zeitschr. Weltforstwirtsch. 6(7): 413-485. 17 pl. 1939.—Descr. the tropical forest regions of the world as sources of timber and other materials of world trade.-W. N. Sparhawk.

13940. LATVIA FOREST DEPT. Latvijas mežu statistika un Mežu Departamenta darbība 1937/38 g. XI. [Forest statistics of Latvia and report of the Forest Department for 1937-1938.] [With Fr. summ.] vii +207p. Riga, 1939. 13941. McMILLEN, JOHN M., ROSS AIKEN GORTNER,

HENRY SCHMITZ, and A. J. BAILEY. The cooking process. Butanol cooking of hardwoods and softwoods. Indust. and Engineer. Chem. 30(12): 1407-1409. 1938.—Aqueous butanol was successfully used as a pulping agent for 6 hardwoods (analyses made for Cross and Bevan cellulose, a-cellulose, pentosans, lignin, and ash). 6 softwoods were not successfully pulped.—M. C. Moore.

13942. MANOZZI-TORINI, LORENZO. La pioppicoltura in Provincia di Apuania. [Poplar culture in Apuania

Province.] Riv. Forest. Ital. 1(3): 47-57. Map, 6 fig. 1939.—Most of the poplar cultivated in this province of N. W. Italy is P. alba; P. canadensis and P. nigra are grown to some extent. Figures on yields are given.—W. N. Sparhawk. 13943. MARKWARDT, L. J., and G. E. HECK. Standard

terms for describing wood. Jour. Forest. 36(1): 3-11. 1938.-Ten descriptive terms with definite classification limits, designed for more accurate description of wood properties,

designed for more accurate description of wood properties, are proposed. Standard terms are applied to a table of 164 American spp.—A. G. Hall.

13944. MARTIN, J. J. E. Sapin-épicéa. Le sapin dans les Alpes de Savoie. Rev. Eaux et Forêts 77(2): 113-119. 1939.—In recent yrs. the proportion of fir in the forests of Savoy is steadily increasing at the expense of spruce. Formerly it occupied a considerably larger area than at present.—W. N. Sparhawk.

13945. MELANDER, Y. A new giant Populus tremula in Norrbotten. Hereditas 24(1/2): 189-194. Illus. 1938.

13946. MONTANELLI. LORENZO GORI. La rinnovazione

13946. MONTANELLI, LORENZO GORI. La rinnovazione naturale dell' abete bianco nel l'Apennino Emiliano. [Natural regeneration of white fir in the Emilian Apennines.] Riv. Forest. Ital. 1(3): 9-23. 7 fig. 1939.—In the central Appenines (Tuscany) Abies alba does not regenerate satisfactorily in pure stands, and the only way to get pure fir stands is to cut clean and plant. In the northern Appenines (Emilia), on the other hand, climate and site appear to be more favorable for fir and it reproduces well in pure stands.-W. N. Sparhawk.

13947. MORISON, MURRAY B. The forests of New Brunswick. Canada Dominion Forest Service Bull. 91. 1-112. 2 maps. 1938.—The results of a general inventory of the forest resources of the Province are presented, including statistics on area of forests by types of growth, stands of timber by kinds, annual increment, annual utiliza-tion and depletion, and statements on forest policy and legislation and economic importance of the forests.—W. N.

13948. NEMEC. ANTONÍN. Vliv jednostranného hnojení fosforečnými hnojivy na výživu sazenic smrku v lesních školkach. VI. Vliv hnojení na resorpci železa a hliniku. [Influence of unbalanced phosphoric acid fertilizing on the nutrition of spruce in forest nurseries. VI. Influence on intake of iron and aluminum.] [With Ger. summ.] Sbor. Cesk. Akad. Zem. 14(1): 33-46. 1939.—Iron intake (Fe₂O₂) of spruce needles increased with decrease of P2Os in the soil; it was slightly decreased with application of superphosphate and Thomas meal. Iron intake increased with increase of soil acidity. On soils deficient in P2Os, application of superphosphate resulted in increased height growth only when the needles contained less than 0.067% Fe₂O₃. and Thomas meal when the F₂O₃ content was below 0.10%. On acid soils Al₂O₃ content of needles was reduced by phosphate fertilizers, especially on the soils poorest in Al₂O₃; on neutral and weakly acid soils fertilizing, especially with superphosphate, resulted in greater Al₂O₃ intake where the soil had abundant Al₂O₃. Application of superphosphate led to increased growth of spruce only on soils poor in Al₂O₃ (less than 0.15% soluble in 1% citric acid) or where the needles contained less than 0.10% Al₂O₃. Thomas meal, on the other hand, increased height growth regardless of the Al_2O_3 content of soil or needles.—W. N. Sparhawk.

13949. NĚMEC, ANTONÍN. Vliv jednostranného hnojení fosforečnými hnojivy na výživu sazenic smrku v lesních školkach. VII. Vliv hnojení na resorpci kyseliny křemičité. [Influence of unbalanced phosphoric acid fertilizing on the nutrition of spruce in forest nurseries. VII. Influence on the intake of silica.] [With Ger. summ.] Sbor. Česk. Akad. Zem. 14(1): 69-77. 1939.—On untreated soils the SiO₂ content of the needles decreased as P₂O₃ content increased; application of phosphates led to a significant increase in SiO_2 intake only on soils deficient in P_2O_6 . On soils rich in both P_2O_6 and SiO_2 fertilizing did not increase the SiO_2 content of the needles, but on soils with less than 250 mg. SiO₂ per kg. there was a distinct increase. SiO₂ content of the needles increased and P_1O_5 content decreased with increase in soil acidity.—W. N. Sparhawk.

13950. OSTROM, C. E. Clear cutting of young northern hardwoods stands. Jour. Forest. 36(1): 44-49. 1938.—Culled old-growth stands regenerated successfully following clear cutting in the birch-beech-maple-hemlock type of northwestern Pennsylvania. The same cutting method applied to 2d-growth stands results in: failure of tolerant hardwoods to seed in; near elimination of beech and birch; abundant reproduction of weed spp.; and an increase of black cherry which may prove undesirable because of high glaze damage and sprout decay hazard. Weeding of such poor 3d-growth is hardly justifiable. Partial cutting of 2d-growth to permit establishment of advance growth is recommended.—A. G. Hall.

13951. ROHMEDER, E., und CHI-YUN CHEN. Keimversuche mit Fichtensamen verschiedener Korngrösse. Forstwiss. Centralbl. 61(6): 177-184. 1 fig. 1939.—Large, medium, and small seed from the same spruce tree generally germinate at practically the same rate, even for seed crops of different yrs. The slower or poorer germination of large seed that is occasionally noted is probably the result of a thicker seed-coating.—W. N. Sparhawk.

13952. SALVADOR, J. Le hêtre dans les Pyrénées et plus spécialement dans les Pyrénées ariégeoises. Rev. Eaux et Forêts 77(2): 101-112.4 pl. 1939.—In this portion of the Pyrenees beech comprises 60-80% of the forest. Most of the present stands originated from natural seeding or sprouts following heavy cutting early in the 19th century, and are practically even-aged, with a scattering of old trees. -W. N. Sparhawk

13953. SCHREUDER, E. J. Het niboengsvraagstuk in Bengkalis. [The niboeng problem in Bengkalis (Sumatra).] [With Ger. summ.] Tectona 32(3): 165-190. 1 pl., 1 fig. 1939.—Stems of the niboeng palm, Oncosperma filamentosum, are in great demand for fish traps. In order to prevent further depletion of the supply and to insure future supplies, the niboeng forests have been put under management and steps have been taken (frill-girdling and poisoning) to reduce the competition of less valuable spp. W. N.

Sparhawk.

13954. SCHWARZ, HANS. Anbaugebiete der Schwarzkiefer in Grossdeutschland. Forstwiss. Centralbl. 61(6): 185-187, 1939.—The natural range of Pinus nigra v. austriaca in Germany is confined to the S. E. portion of the lower Danube district, between 240 and 1,460 m. altitude. It has been grown in other sections, and because of its considerable silvicultural and economic value its cultivation should be further extended. It thrives on limestone soils, but a high lime content is not essential. On the basis of climatic and site requirements the author designates several regions in Germany where it may be grown to good advantage.—W.N.Sparhawk.

13955. SNOW, ALBERT G. Jr. Progress report on a set of spruce thinning plots established in 1906 in Corbin Park, N. H. Jour. Forest. 36(1): 19-25. 4 fig. 1938.—Thinning from below in an old-field red spruce stand in 1906, 1915, and 1935, removing 20%, 33%, and 20% of the basal area, respectively, resulted in increased annual increment, low mortality, and abundant reproduction. An uncut check plot showed decreased annual increment, high mortality, and no reproduction above 0.5 ft. tall.—A. G. Hall.

13956. SPAULDING, PERLEY. A suggested method of converting some heavily Nectria-cankered hardwood stands of northern New England to softwoods. Jour. Forest. 36 (1): 72. 1938.—The establishment of natural softwood seeding by releasing selected individuals and by planting groups of 4-yr. spruce transplants is recommended for the poorer

sites.—A. G. Hall.

* 13957. STRUGNELL, E. J. Developments in hardwood regeneration. Malayan Forester 8(2): 53-56. 1939.—Too severe exposure of young primary hardwoods (Balanocarpus heimii, Shorea laevis, S. maxwelliana) leads to swamping of all tree growth by climbers. Instead of a heavy thinning, a light preliminary opening is advocated to enable regeneration of the desirable spp. to start and develop slowly. A 2d, heavier cutting after the hardwood regeneration is

established facilitates its rapid growth.—W. N. Sparhawk.
13958. TAMM, OLOF. Om humustillständets betydelse för skogen å en sydsvensk tallmo. [The importance of humus conditions to the forest on a South Swedish pine heath area.] Skogen 25(21): 385-388; (22): 403-406. 6 fig. 1938—In 1922 a typical pine stand was lumbered and resulting brush scattered over part of the area to an average

depth of ½ m., while on either side the site was bared of brush. The whole area was planted with pine seedlings. Decaying brush seemed to stimulate nitrification in the soil and otherwise influence it favorably, yet 16 yrs. later the pines on the brush-covered site averaged only 3.54 m. tall against 3.21 m. for those on adjacent bared areas. The trees on bared areas, however, were less thrifty in appearance and more irregular in size than on the brush-covered site -G. S. Perry.

13959. THOMAS, A. V. The timber of yemani grown in Malaya. Malayan Forester 8(2): 84-85. 1939.—Notes on the mechanical properties of the wood of Gmelina arborea grown in Malaya, compared with that from Burma and India and several other woods.—W. N. Sparhawk.

13960. THOMSON, THOMAS, and M. R. K. JERRAM. An outline of forestry. viii + 208p. Frontispiece, 3 pl., 10 fig. Thomas Murby and Co.: London; Nordemann Publishing Co., Inc.: New York, 1938. Pr. \$2.25.—The main object of this book is to provide students an outline of the kind of knowledge they will have to acquire in the study of forestry; it is not intended to supply the theoretical knowledge which they will get elsewhere. Part I deals with forest policy, which is defined as that branch of forestry which deals with the social and economic aspects of forestry and considers, especially, the duties of the State as regards forests. Part 2, Forest Bionomics, includes the foundations of silviculture (structure, form, and life processes of trees; their relation to the environment; forest as a community); the practice of silviculture; and forest protection. Part 3, Forest Economics, covers valuation and finance, forest mensuration, and utilization and marketing. Part 4 dis-cusses forest management, regulation of yield, and the preparation of working plans.-W. N. Sparhawk.

13961. TOUSSAINT, E. Les taillis sous futaie en sol riche de la plaine d'Alsace. Leur traitement—leurs produits. Rev. Eaux et Forêts 77(3): 197-212. 4 pl. 1939.—The forests on the rich, moist soils of the Alsatian plain, which are subject to inundation in the spring, are mostly handled as coppice (mainly alder and ash, with some birch, maple, oak, hornbeam, and hazel), with standards of ash (40-50%), pedunculate oak (10-20%), alder, and poplar. Elm, formerly important, is disappearing owing to the alm discase. important, is disappearing owing to the elm disease. Alder and ash coppice, managed on a 30-yr. rotation, produce trees of 30 cm. diam. and 25-26 m. tall. The overstory trees also grow fast. Acer pseudoplatanus, introduced some 40 yrs. ago, grows as fast as ash. Regeneration of the overstory is done by planting in the fall, after logging. American hickories, oaks, and black walnut were planted 70-100 yrs. ago as well as more recently and have done well.—W. N.

Sparhawk.

13962. TROTTER, H. Official list of trade names of Indian timbers. (Revised.) Indian Forest Rec. Utilization 1(7): 189-210. 1938.

13963. TROUP, R. S. Forestry and state control. Clarendon Press: Oxford, England, 1938. Pr. 3s 6d.

13964. UYL, D. DEN, O. D. DILLER, and R. K. DAY. The development of natural reproduction in previously grazed farmwoods. *Indiana Agric. Exp. Sta. Bull.* 431, 1-28. 23 fig. 1938.—Based on several years' intensive study, the authors conclude that the exclusion of livestock is the first step in the management of farm woods in the better agricultural sections of the Central States. The rate of recovery was found dependent on the stage of decadence at the time the animals were excluded. Wooded areas of the open park stage were unable to make successful progress toward re-habilitation until species which could successfully invade the sod had reestablished conditions favorable to the germination and growth of the desirable species. The time required to progress from one stage of decadence to the next higher stage varied with the type of forest. It was most rapid in the wet upland type, followed closely by the beechmaple, and very slow in the oak-hickory types. Soil moisture was evidently the most important limiting factor in the establishment and survival of natural reproduction. In the open park woodlands, during drought the soil moisture dropped below the minimum at which seedlings could survive. The responsible factors are high transpiration rate of the trees and of the bluegrass sod, the absence of leaf

litter, increased light intensity, and wind movement. Silvicultural practices favoring natural regeneration in the transition and open-park woods are discussed.—Courtesy Exp.

Sta. Rec.

13965. VINCENT, GUSTAV. Die Wandelbarkeit der Nadelholzsamen und der aus ihnen gezogenen Pflanzen. Forstwiss. Centralbl. 61(8): 250-255. 4 fig. 1939.—There is great variability in size of cones and size and wt. of seed of such conifers as spruce and pine, which should be taken into account in tree breeding. These differences may be dependent on position in the tree, on age or condition of tree, or on environmental factors. Largé cones generally contain larger and more numerous seed, and larger seed often, but not always, produce larger seedlings. The ave. wt. of seed of a given sp. varies greatly with latitude and with altitude above sea level; that from high latitudes and altitudes.—W. N. Sparhawk.

13966. WALKOM, H. C. Some suggested methods of logging to improve natural regeneration in the Clay Belt. Forest. Chron. 15(2): 103-106. 1939.—Cutting 4-foot instead

of 16-foot lengths in pulpwood operations, leaving spruce seed-trees, and in some instances cutting in strips, combined with care to protect young growth from fire and logging injury, are recommended.—W. N. Sparhawk.

13967. ZENTGRAF, EDUARD. Lichtwuchsbetrieb. Allg.

13967. ZENTGRAF, EDUARD. Lichtwuchsbetrieb. Allg. Forst- u. Jagd-Ztg. 115(4): 112-119. 1939.—In view of the fear of many foresters that recent excess cutting in German forests will seriously deplete the growing stock and soon lead to reduction in yields, the author reviews the results of several "light-cutting" operations in beech, spruce, and pine forests. These operations cut 15-30% of the stand in 50- to 70-yr.-old spruce, 30-40% in 30-40-yr. beech, 40-50% in 25-30-yr. pine, and 63% in 70-80-yr. beech. In general, the cutting stimulated growth considerably over that in check stands or even in those heavily thinned. Light-cutting requires considerable care in spruce, owing to the danger of windthrow and because too heavy cutting reduces the final yield, especially when spruce is grown outside of its natural range. The method is applicable to most forms of forest except 1-storied, even-aged, high forest. —W. N. Sparhawk.

PHARMACOGNOSY AND PHARMACEUTICAL BOTANY

HEBER W. YOUNGKEN, Editor

(See also in this issue Entries 12475, 12665, 12848, 13144, 13167, 13842, 13896, 14028, 14144, 14153)

13968. FLETCHER, HAZEL, and LOIS DENNHARDT. Adequacy of labeling of certain textile fabrics with regard to fiber content. Jour. Agric. Res. 58(12): 895-903. 3 pl. 1939.—Fabrics tested were purchased in 18 stores in 7 towns and cities of the Midwest (U. S.). At the time of purchase anv information on the labels with regard to fiber content was noted. When the fiber content was not stated on the label, as much information as possible was obtained from the salesman. Of the 268 fabrics purchased, 133 contained one kind of fiber, and 135 were of mixed fiber content. In each case the information on the label and that given by the salesman were compared with determinations made in the laboratory. More of the fabrics of one fiber are labeled, and more of the information accurate, than of mixed The information, from labels and from salesmen, for both groups of fabrics was inaccurate. The authors give 2 methods for counting each kind of fiber in mixed fabrics. the rulings on the fiber content of textiles of the Federal Trade Commission, methods of identification and analysis and 26 references.—Authors.
13969. HAEFTEN, F. E. van. De voornaamste chemische

13969. HAEFTEN, F. E. van. De voornaamste chemische bestanddeelen van den tjandoerook. [The principal chemical constituents of the fumes of smoking opium.] Geneesk. Tijdschr. Nederland. Indië 79(17): 1062-1083. 1939.—Considerable quantities of unaltered morphine and codeine are present in the fumes of smoking opium, i.e., 9% of the

morphine originally incorporated in the chandu reaches the smokers' mouth and lungs. By far the largest part of the total sediments in the fumes consists of a dark pitch-like material, containing the specific odoriferous principles of the smoke. Its analogue in tobacco smoke is the tobacco resin. Narcotine, is not detected in the fumes. It is apparently destroyed by progressive pyrolysis: during the roasting process in the manufacture of chandu; during the roasting of chandu pills preliminary to smoking; and during the smoking itself in the aperture of the pipe bowl. Considerable amts. of meconin, a decomposition product of narcotine are detected in the fumes. As meconin is easily volatilized at 102.5°C. its vapors act as a vehicle in carrying over discrete particles of the alkaloids present in chandu fumes. —W. Rudolfs.

13970. NOLTE, A. J., and H. W. von LOESECKE. Characteristics and composition of watermelon seed oil (Cuban Queen variety). Jour. Amer. Chem. Soc. 61(4): 889-891: 1939.—Various chemical and physical characteristics of the glycerides of seeds of Citrullus vulgaris have been determined.—H. N. Glassman.

13971. SCHULTES, R. E. Plantae Mexicanae. II. The identification of teonanacatl, a narcotic basidiomycete of the Aztecs. Bot. Mus. Leaflets Harvard Univ. 7(3): 37-54.1 pl. 1939.—Paneolus campanulatus var. sphinctrinus.

PLANT PHYSIOLOGY, BIOCHEMISTRY, AND BIOPHYSICS

F. E. DENNY, Editor

(See also in this issue Entries 12481, 12490, 12510, 12527, 12568, 12657, 12665, 12675, 12727, 12748, 12831, 13705, 13714, 13734, 13781, 13789, 13791, 13802, 13803, 13804, 13806, 13814, 13833, 13837, 13841, 13874, 13877, 13882, 13890, 13891, 13892, 13897, 13900, 13901, 13903, 13905, 13910, 13912, 13937, 14072, 14076, 14086, 14087, 14126)

ABSORPTION, NUTRITION

13972. ARNON, D. I., and P. R. STOUT. The essentiality of certain elements in minute quantity for plants, with special reference to copper. Plant Physiol. 14(2): 371-375. 1939—By using suitable procedures for removing incidental contaminations of heavy metals derived from containers, distilled water and nutrient salts, consistent and reproducible demonstrations of the indispensability of Cu, Zn, and Mn for the growth of tomato plants in nutrient solns. were made possible. The essentiality of each of these metals was tested and confirmed by a) producing characteristic deficiency symptoms as a result of omitting the element in question from the nutrient medium; b) preventing or correcting the deficiency by supplying the omitted element to the roots; and c) correcting the deficiency by supplying

the missing element through the aerial portions of the plant, and thus demonstrating its direct effect on the plant as distinguished from a possible indirect effect resulting from a modification of some unfavorable microbiological or chemical condition of the culture medium. Since absolute freedom from contamination of the nutrient medium is unattainable, there can be no a priori objection to regarding almost any element present as an impurity (particularly if it is frequently encountered in plant tissues) as conceivably an essential element for plants. All that can be stated definitely is that a given element is or is not required in an amount greater than that found in the culture medium as a contaminant.—Authors.

13973. DRAWERT, HORST. Über die Aufnahme und Speicherung von prune pure durch die pflanzliche Zelle. Planta 29(1): 179-212. 1938.—Prune pure is stored in cells owing to its solubility in organic solvents in neutral, undissociated form. Aluminum salts may influence the electrical condition of the dye soln. and thus decrease its solubility in organic solvents. Prune pure has 2 reversal points, one at pH 3, the other at pH 3.5. It cannot be used as a vital indicator. Between pH 3 and 8.5 the dye is present in its neutral molecular form. Na, K, Ca and Mg salts do not interfere with the uptake of the dye or its cataphoretic properties. In the presence of Al it becomes positively charged.—B. R. Nebel.

13974. HURD-KARRER, ANNIE M. Antagonism of certain elements essential to plants toward chemically related toxic elements. Plant Physiol. 14(1): 9-29. 5 fig. 1939.—Arsenic injury is a function of the available phosphate conc. with the protective As/P ratio in nutrient solns. near 1:5. Rb injury is a function of the available K conc. with the protective Rb/K ratio in nutrient solns. near 1:2. Sr injury is a function of the available Ca conc. with the protective Sr/Ca ratio in nutrient solns. near 1:1. The assumption is made that these effects are the result of some degree of unselectivity in absorption and utilization of chemically related elements, so that the chance of harmful substitution of the toxic element for the essential nutrient, as an organic molecule is synthesized, depends on the proportionate availability of the 2. If the assumption proves to be correct, this particular type of antagonism may appropriately be designated "mass antagonism."—A. M. Hurd-Karrer.

13975. KETCHUM, BOSTWICK H. The absorption of phosphate and nitrate by illuminated cultures of Nitzschia closterium. Amer. Jour. Bot. 26(6): 399-407. 1939.—The rate of absorption of nitrate by illuminated, pure cultures of this marine diatom is independent of the conc. of phosphate, but is directly related to the conc. of nitrate in the medium. The rate of absorption of phosphate is directly related to the concs. of both phosphate and nitrate in the medium. The rate of growth is independent of the conc. of phosphate and nitrate except for phosphate concentrations of less than 50 γ per liter, when it decreases. The proportion in which phosphate and nitrate are absorbed is largely independent of the nitrate conc., but increases as the concentration of phosphate increases. If the cells are in a medium in which the ratio of concs. is higher than the usual ratio in natural sea water, the absorption by the cells tends to reduce the ratio toward the usual value. If the ratio of concs. is lower than usual the metabolism of the cells tends to increase the discrepancy.—B. H. Ketchum.

13976. LUTTKUS, K., und R. BÖTTICHER. Über die Ausscheidung von Aschenstoffen durch die Wurzeln. I. Planta 29(3): 325-340. 10 fig. 1939.—Maize plants kept in the dark in dilute nutrient solns. lose the following ions: K, PO₄, SO₄, NH₄, Ca (traces) and Mg (traces). Older plants lose more K than younger plants. The K excretion is independent of the transpiration stream. Plants will reabsorb K when light is added. The K loss may amount to 15-30% of the total; most of it comes from parts above ground. The nature of the labile binding which exists in the light between K and certain cell constituents is unknown.—B. R. Nebel.

13977. THOMAS, WALTER, and WARREN B. MACK. Foliar diagnosis: Nutritional differences affecting the yields of potatoes from similarly treated plots. Proc. Amer. Soc. Hort. Sci. 36: 573-589. 1938(1939).—The expts. were conducted on a long-continued field expt. with N from NaNOs and also from manure, phosphoric acid from superphosphate, and potash from the KCl. Erosion influences together with native soil heterogeneity was indicated by relative yields between similarly treated pairs of plots of from 0.9% to 45.3%. The intervention of the fertilizers on the nutrition of the plants is followed by an examination of their effect on (1) the intensities of nutrition and on (2) the equilibrium between N-P₂O₅-K₂O (Plant Physiology 12. 571-600. 1937) in the 4th leaf from the base taken at 4 periods during the growth cycle. Potash is the dominant factor leading to increased intensity. A low intensity is always associated with low yields, but owing to the phenomenon of "luxuskonsumption" of potash, high intensities are not necessarily associated with high yields, although high yields are always associated with an adequate intensity. The mean values of

the composite NPK-units (Plant Physiology 12. 571-600. 1937) during the growth cycle bear a relationship to the yields of tubers. In 7 similarly treated couplets, higher K_2O in the NPK-unit is associated with the higher yielding plot, and in 2 similarly treated plots the higher yielding plot has higher P_2O_5 in the NPK-unit. Differences in yield of similarly treated plots, attributed in the traditional agronomical method to chance variations of soil and other unknown sources of error, in the method of foliar diagnosis are related to experimentally determined facts of nutrition.—Authors.

13978. THOMAS, WALTER, and WARREN B. MACK. Foliar diagnosis: The influence of the soil on the action of fertilizers. Plant Physiol. 14(1): 75-92. 1939.—The foliar diagnoses (Plant Physiology 12: 571-600. 1937) of similarly fertilized duplicate pairs of plots from a long-continued field expt. with potatoes were compared. The differences in the relative yields of couplets as the result of soil variation ranged from 4.7% to 54.8% and reflected differences in the nutrition of couplets with respect to the intensity and also to the quality. These differences in the 4th leaf from the base sampled at 4 dates during the growth cycle are examined with the aid of graphs showing the changes in the intensities and in the N-P₂O₅-K₂O equilibrium from one sampling to another. In 9 out of 13 pairs of treatments higher intensity of nutrition is accompanied by higher yields. In 7 of these 9 cases the higher intensity is the result of an increase in the K2O of the NPK-unit; in the other 2 cases the higher intensity is the result of an increase in the N of the NPK-unit. In 4 cases higher intensity of nutrition is accompanied by lower yields with, in one case, the lower yielding plot having abnormally low P₂O₅ in the NPK-unit. The foliar diagnosis of 2 of the couplets viz. [N] and [P] are anomalous in that both the intensity of nutrition and the composition of the NPK-unit of the higher yielding

duplicate is furthest removed from the optimum intensity of the optimum NPK-unit.—Authors.

13979. WADLEIGH, C. H., and J. W. SHIVE. Base content of corn plants as influenced by pH of substrate and form of nitrogen supply. Soil Sci. 47(4): 273-283. 1939.

—Corn plants were grown in 2 types of nutrient soln., (1) containing N only in the form of nitrate and (2) containing containing N only in the form of nitrate and (2) containing nitrate-N and ammonium-N in approx. equivalent proportions, each adjusted to pH values ranging from pH 3 to pH 8. Plants were analyzed for total and soluble K, Ca and Mg and data for total and active acidity of the expressed sap of the plants are also given. The total base content of all the plants was higher than the usual base-content value for soil-grown plants. There was a direct correlation between high K content and the pH of the expressed sap. The plants grown with soln. of Type 2 showed lower total base content and lower pH of the expressed sap than did those grown with solns of Type 1. Absorption of the ammonium ion evidently retarded the absorption of the other cations. The presence of ammonia in the nutrient soln. had the most depressing effect on C absorption and the least effect on Mg absorption. High K absorption apparently had a depressing effect on C and Mg absorption. The pH of the nutrient medium between the limits of pH 4 and pH 8 had little effect on base absorption and accumulation. The presence or absence of the ammonium ion had a much more marked effect on absorption and accumulation of basic nutrients than had the variation in the pH levels of the substrate. The pH values of the solution films adjacent to the absorbing plant roots in contact with soln. of Type 2 were apparently considerably lower than those of corresponding films on roots in contact with soln. of Type 1, regardless of the pH levels of the body of the solns. This phenomenon may be partially responsible for the difference in base content shown by these 2 series of plants.—Auth. summ.

13980. WILLIS, L. G. (originally compiled by). Bibliography of references to the literature on the minor elements and their relation to plant and animal nutrition. 3rd ed. 488p. Chilean Nitrate Educational Bureau, Inc.: New York, 1939.—A compilation of abstracts, nearly all of them taken from Chemical Abstracts or the Experiment Station Record. Altogether, 4628 abstracts and references are included, grouped according to the element considered. The elements treated are Al, As, Ba, Be, B, Br, Cd, Ca, Ce,

Cs, Cl, Cr, Co, Cu, F, Ge, Au, I, Fe, Pb, Li, Mg, Mn, Hg, Mo, Ni, Pt, Ra, Rb, Se, Si, Ag, Na, Sr, S, Te, Tl, Sn, Ti, U, V, and Zn.

AUXINS, GROWTH HORMONES

13981. BURKHOLDER, PAUL R. Production of growth substance by bacteria in media containing specific organic and inorganic nitrogenous compounds. Amer. Jour. Bot. 26 (6): 422-428. 1 fig. 1939.—Avena-coleoptile tests for growthpromoting substances were made on cultures of Aerobacter aerogenes and Escherichia coli grown on glycerol-mineral salts-agar in which the sole source of N was either an amino acid, KNO3, or NH4Cl. Substances producing coleoptile growth-curvatures were found in the cultures supplied with any one of 17 amino acids. Furthermore, A. aerogenes formed active substance in synthetic media containing either KNOs or NH.Cl. Uninoculated media remained inactive, with the exception of tryptophane agar which showed some activity following sterilization in the autoclave. Although growth promotion was observed with all the inoculated substrata in certain ranges of conc., bacterial cultures supplied with tryptophane gave positive Avena curvatures (toward the blocks) at higher cones. of the activated medium, indicating growth inhibition.—P. R. Burkholder.

13982. DeFRANCE, J. A. Effect of synthetic growth substances on various types of cuttings of Arctostaphylos uva-ursi. Proc. Amer. Soc. Hort. Sci. 36: 800-806. 2 fig. 1938(1939).—Bases of cuttings were treated in solns. of 2 mg., and 4 mg. indolebutyric acid per 100 cc. water for 24 and 43 hrs. Multiple terminal cuttings were first to root and produced from 80 to 100% rooted cuttings; single terminals produced from 40 to 80%; heel cuttings from 53 to 80%; and single terminals from which 1 inch of the tip was removed from 0 to 60%. Differences of results were obtained by different concs. of the soln., the length of treatment and type of cutting. Least response was obtained from cuttings which had the upper leaves and tip removed and greatest response from those which had the most foliage and tips intact.—J. A. DeFrance.

13983. DeFRANCE, J. A. Propagation of Sciadopitys verticillata with root-inducing substances. *Proc. Amer. Soc. Hort. Sci.* 36: 807-808. 1 fig. 1938(1939).—The bases of the cuttings were treated for 20 hrs. in a soln. of 2 mg. indole-butyric acid to 100 cc. water. 70% rooted cuttings were secured by treatment; none of the untreated cuttings rooted. —J. A. DeFrance.

13984. FANARA, MARIA GRAZIA. Reazione da ferita del tessuto corticale e midollare di fusti giovani di Ricinus communis. [Reactions to wounds by cortex and pith tissues in R. communis.] Nuovo Gior. Bot. Ital. 45(1): LXIV-LXVII. 2 fig. 1938(1939).—After radial or tangential cuts in the stem, if the exposed surface is smeared or sprayed with borated vaseline a wound-cambium normally forms but if the surface is treated with melted paraffin, no wound-cambium develops. Likewise if a wedge of solid paraffin be inserted in the wound no formation of cambium occurs. Failure to produce wound-cambium is apparently due to contact with the solid paraffin, not to any lack of "wound hormone".—F. Ramaley.

13985. HELLINGA, G. Heteroauxin und Polarität, morphologische und elektrische, bei Coleus-Stecklingen. Mededeel. Landbouwhoogesch. Wageningen (Nederland) 41 (1): 1-69. 1 pl., 5 fig. 1937.—The transport of growth-substance in the cuttings is exclusively basipetal. Wound substances are also transported strictly in a basal direction and induce, like the growth-substance, root-formation in the pericycle. The measuring of the potential differences was made with an apparatus in which 2 triode lamps were placed. A platinum needle covered with AgCl was used as one of the electrodes. In vertical position the top end of the internode was always negative with regard to the basal end. This phenomenon is the same with the cutting in the inverse as well as in the normal position. The current of growth-substance induced through addition of hetero-auxin is without influence. When the cuttings are inverted the same potential distribution is directly formed. This phenomenon corresponds with the geoelectric effect of Brauner. After root-formation a difference in potential decline was observed in the series treated with growth-

substance as well as in those not treated. The potential decline is not correlated with the position of the cutting or with the presence of growth-substance, but with the resulting root-formation. With root-formation at both sides the potential difference is smaller than when it is one sided (at the base); when the root-formation is weak through the addition of small amounts of hetero-auxin it is larger than with strong root-formation. The static electric field had no influence on the transport of growth substance.—H. L. G. de Bruyn.

13986. MITCHELL, JOHN W. Effect of indoleacetic acid on the growth of some crop plants. Proc. Amer. Soc. Hort. Sci. 36: 171-176. 1938(1939).—The leaves, petioles and stems of some succulent plants became bent and curled within a few hrs. after they were sprayed with aqueous solns. of β -indoleacetic acid, indicating very rapid absorption. Plants treated in this way recovered rapidly, and in most cases could not be distinguished from untreated plants within 36 hrs. after treatment. Aqueous solns. of indoleacetic acid containing 300 mg. of acid per liter repressed the growth of bean plants that were grown in a greenhouse and sprayed with the soln. Weaker solns, had little effect on their growth. Solns, containing from 10 to 300 mg, had little effect on the growth of marigold plants although marked bending and curling of the leaves occurred following repeated treatments. Various amts. of indoleacetic acid dissolved in oil or water and sprayed on oat and bean seeds that were later planted in the field, had no effect on their germination or the fresh weight of the tops at the time of fruiting. Indoleacetic acid had no appreciable effect on the growth of corn, beans, oats, or soybeans that were grown in the field, when sprayed on the plants. The fresh weights of the tops of bean plants grown out of doors and irrigated with water containing 0.01 and 1 ppm. indoleacetic acid were slightly greater than those of control plants. The fresh weights of the tops of marigold plants irrigated with water containing indoleacetic acid were not affected by 0.01 ppm., but were repressed when a soln containing 1 ppm. was used. Indoleacetic acid had no effect upon the time of flowering of any of the plants studied. J. W. Mitchell.

13987. ROMBERG, L. D., and C. L. SMITH. Effects of indole-3-butyric acid in the rooting of transplanted pecan trees. Proc. Amer. Soc. Hort. Sci. 36: 161-170. 6 fig. 1938 (1939).—Indole-3-butyric acid stimulated root formation in transplanted pecan trees when applied in auger holes bored through the roots. Round toothpicks 4 cms. long were impregnated with the indole-3-butyric acid at concs. of 0.5, 1, 2, and 4 mg. per toothpick. Mixtures of the chemical in lanolin and in wheat flour dough at a conc. of 0.5% by weight were also used. Rooting was stimulated by all concs. but the best rooting was obtained from use of toothpicks each carrying 4 mg. The toothpick method of applying the chemical proved to be superior to the use of lanolin or dough mixtures.—L. D. Romberg.

13988. STOUTEMYER, V. T. Talc as a carrier of substances inducing root formation in softwood cuttings. Proc. Amer. Soc. Hort. Sci. 36: 817-822. 1938(1939).—In studies covering softwood cuttings of 12 genera, indole butyric acid and naphthalene acetic acid proved at least equally effective and more easily applied in dusts than in aqueous solns. With most plants, a mixture of one part of growth substance in 250 parts of powdered talc gave the best rooting. A conc. of 1 to 1000 was best for a few tender plants. Occasional stimulation of rooting resulted from the application of talc alone to the base of the cuttings. The dust application of growth substances had several advantages over aqueous soln. treatments including ease of application, economy of material and greater latitude of dosage.—V. T. Stoutemyer.

13989. THIMANN, KENNETH V., and CHARLES L. SCHNEIDER. The relative activities of different auxins. Amer. Jour. Bot. 26(5): 328-333. 1939.—Although it is well known that different substances have different activities as auxins, it is often thought that the ratio between the activities of any 2 substances would always be the same. In view of the increasing importance of precise comparisons the influence of the test method and procedure were studied. The growth-promoting activities of indole-3-propionic,

indole-3-butyric, a-naphthalene acetic, phenyl-acetic, γ -phenyl butyric and benzofurane-3-acetic acids were compared with that of indole-3-acetic acid as standard. The ratio between the activity as determined by any method and that of indole-acetic acid in the same method is termed the "relative activity." Relative activities for straight growth as determined on Avena coleoptiles differ from those detd. on Pisum internodes. The differences between these 2 plants are not due to differences in carbohydrate supply. With Pisum the values for straight growth differ from those for slit stem curvatures. This is explained on the basis of differential sensitivities of tissues within the plant. With any of the methods, the values also vary somewhat with the sensitivity of the plants on the day of the test. By taking the mean of several series of expts. with each method, approximate relative activities have been derived and tabulated.—Auth. summ.

13990. ZIMMERMAN, P. W., A. E. HITCHCOCK, and FRANK WILCOXON. Responses of plants to growth substances applied as solutions and as vapors. Contr. Boyce Thompson Inst. 10(3): 363-376. 2 fig. 1939.—29 compounds which were physiologically active as plant growth substances when applied in soln were found to be active also when applied as vapors to the following plants: tomato, corn, Klondike cosmos, marigold, girasole, Mimosa, Chenopodium, and garden pea. Plants exposed under bell jars or large beakers to vapors of the substances showed practically all the responses previously reported for these compounds applied as solns. Characteristic responses were induced with exposures as short as 30 sec. The following substances were used in the expts.: a-naphthaleneacetic acid, methyl anaphthaleneacetate, ethyl a-naphthaleneacetate, acenaphthyl-(5)-acetic acid, l-naphthaleneglycollic acid, l-naphthaleneglyoxalic acid, α -naphthylacetonitrile, α -naphthoxyacetic acid, β -naphthoxyacetic acid, β -naphthyl mercaptoacetic acid, β -naphthyl glycine, α -naphthoylpropionic acid, β -indoleacetic acid, methyl β -indoleacetate, ethyl β -indole acetate, indole- α -meta- β -acetic acid, β -indolepropionic acid, methyl β -indolepropionate, β -indolebutyric acid, methyl β indolebutyrate, ethyl β -indolebutyrate, phenylacetic acid, methyl phenylacetate, ethyl phenylacetate, mandelic acid, cis cinnamic acid, irradiated methyl cinnamate and ethyl cinnamate, and nicotinic acid. Ten of these substances were listed for the first time as physiologically active substances. Parthenocarpy (development of ovaries without fertilization of the eggs) was induced by exposing potted holly plants with unisexual flowers and flower buds to the vapors of naphthaleneacetic acid and the methyl and ethyl esters. The phenyl and indole substances were not as effective as the naphthalene. After exposure to the vapors the berries developed rapidly and were nearly full size in 30 days. There was no fruit set in controls where flowers were not pollinated. The well-known "triple response" of etiolated politiated. The well-known "triple response" of etiolated pea seedlings commonly associated with the effect of ethylene gas was induced with vapors of 17 growth substances. Excessive elongation of etiolated coleoptiles and mesocotyls of corn occurred when the seedlings were exposed to vapors of these substances in light or in darkness. Pronounced curling and swelling of the nodes were also noted. There is presented a review of the responses of plants to growth substances applied in soln, and the similarities between responses induced with the unsaturated hydrocarbon gases and vapors of growth substances are discussed. The usual responses of leafy plants from exposure to the vapors were epinasty of leaves and bending of the stem within an hour or two, swelling of stems and leaves within 48 hrs., induction of roots on stems and leaves in 5-10 days, inhibition of buds and retardation in rate of stem elongation after the first day.—P. W. Zimmerman.

OSMOSIS, PERMEABILITY

13991. BRAUNER, L., und MAR BRAUNER. Untersuchungen über den photölektrischen Effekt in Membranen. I. Protoplasma 28: 230. 1937.—Asymmetric radiation of Elodea leaves shows that light causes a decrease in the mobility of the cations and an increase in the mobility of the anions in the membrane. The latter effect is explained as decrease in the charge of the membrane surface (primary photo-effect), the latter one as narrowing of the pores

(secondary effect). With the exception of AlCl₃, where even the anion is influenced by the secondary effect, the permeability reaction always seems to be dominated by the primary effect.—Courtesy of Kolloid Zeitschr.

13992. BREWIG, A. Auslösung leichter Wasserdurchlässigkeit an Wurzeln von Vicia faba. Planta 29(3): 341-360. 10 fig. 1939.—Generally permeability of the root for water, enhanced by active transpiration has been observed only in entire plants. Excised roots may also be used. The enhanced permeability may be induced by a transpiring root base. The induction may transgress a cut and is thus not dependent upon the continuity of living cells. Pressure gradients in the xylem of the roots may condition permeability. The shoot may do the same, whereby the induction is conducted by rise and fall of the differences in pressure caused by transpiration.—B. R. Nebel.

caused by transpiration.—B. R. Nebel.

13993. DRAWERT, HORST. Zur Frage der Stoffaufnahme durch die lebende pflanzliche Zelle. Planta 29(3): 376-391. 7 fig. 1939.—Several rhodamins were tested for solubility in organic solvents, for electrical charge and for their uptake by epidermis of Allium. Only the undissociated rhodamins enter the living cell. An apparent exception occurs with free oleic acid which enhances the uptake of neutral organic solvents. Also the epidermal cells may contain free fatty acids. Not merely the protoplasmic surface layers are important, but also the partition coefficient.—B. R. Nebel.

13994. MOSEBACH, G. Kryoskopisch ermittelte osmotische Werte bei Meeresalgen. Beitr. Biol. Planzen 24: 113. 1936.—Compared with the evidently too high values of the plasmolytic methods the cryoscopic procedure yields the following results: Sargassum thallus 6.6 to 6.7, Cystosira 5, Rytiphlaea 4.6, and Spiridia 3.8 atm. above the osmotic value of the seawater.—Courtesy of Kolloid Zeitschr.

13995. ROBERTS, O., and S. A. STYLES. An apparent connection between the presence of colloids and the osmotic pressures of Conifer leaves. Sci. Proc. Roy. Dublin Soc. 22(10): 119-125. 1939.—The osmotic pressures of Conifer leaves of different spp. were determined both cryoscopically and plasmolytically. In the case of spp. such as Sequoia sempervirens, Torreya, Keteleeria, whose leaves do not contain colloids, results by the 2 methods are in good agreement. When colloids are present, e.g., in the Araucarias and Taxus, the osmotic pressures as detd. plasmolytically are always much higher than the cryoscopic figures for the expressed saps of the same leaves. This difference may be due to the water-imbibing powers of the mucilaginous colloids present.—Authors.

13996. WEINBRENN, CLARA. A comparative study of the leaf saps of certain South African Highveld grasses. S. African Jour. Sci. 35: 317. 1939.—The leaves of Trachypogon plumosus, Elionurus argenteus and Themeda triandra, were collected weekly from the Botanical Research Station at Frankenwald, about 12 miles north of Johannesburg. Their osmotic values were detd. cryoscopically, after being frozen overnight on solid CO₂: the lowest osmotic values and range were recorded in Trachypogon plumosus and the highest in Themeda triandra. The seasonal trend showed low osmotic values in spring in all the grasses, with increase towards the end of the season. The relative increase and decrease of osmotic values and soil moisture content were often disproportionate. After rainfall, there was usually a greater percentage of sap expressed, and a decrease at the end of the season. The rate of change of osmotic values in the 3 spp. was almost the same.—C. Weinbrenn.

GERMINATION, DORMANCY

13997. RUGE, U. Zur Physiologie der genuinen keimungshemmenden und keimungsbeschleunigenden Stoffe von Helianthus annuus. Zeitschr. Bot. 33(12): 529-571. 1939.— In Helianthus and Avena sativa substances can be recognized which hinder germination and which are released during swelling during germination and thus accumulate, e.g., on moist filter paper; but in fruits repeatedly sown on the same paper these substances are inactivated. During the further development of the seedling, germination-accelerating systems arise. In the plumule, radicle, hypocotyl, cotyledons and pericarp of young Helianthus seedlings these systems can be recognized and are not species-specific. Whether

these substances have a retarding or accelerating affect on germination depends on (1) whether the organs tested are taken from air dry or swollen achenes, (2) the viability of the fruits and (3) their stage of development. From airdry fruits substances retarding growth are exclusively obtained. The possibility is discussed of the conversion during germination of a growth-retarding substance like hydrocyanic acid into a growth-accelerating substance, thiocyanic acid.-J. H. Priestley.

13998. SINGH, B. N., P. B. MATHUR, and M. L. MEHTA. Determination of catalase ratio as a rapid method of seed testing. *Trop. Agric.* [*Trinidad*] 15(11): 260-261. 1938.—Data showing the relation between catalase ratio and germination capacities in Zea mays, Pisum arvense, Cajanus indicus, Pisum sativum, Triticum vulgare, and Cicer arietinum indicate that generally speaking there is a fairly high positive correlation. A catalase ratio greater than unity is associated with seeds of a high degree of viability, and the greater the value of the catalase ratio the higher the viability of the seeds. But this correlation varies with the species.—W. D. Pierce.

13999. TOOLE, E. H., and E. A. HOLLOWELL. Effect of different temperatures on the germination of several winter annual species of Trifolium. Jour. Amer. Soc. Agron. 31(7): 604-619. 1939.—Germination studies were made on scarified and unscarified seed of Trifolium resupinatum (Persian clover), T. glomeratum (cluster clover), T. reflexum (buffalo clover), T. subterraneum (subterranean clover), and T. procumbens (low hop clover), at 5°, 10°, 15°, 20°, 30°, and 35° C at various intervals over a 3-year period. The germination of the scarified seed of all spp. was inhibited in varying degrees at 30° and 35° C. Subterranean and low hop clovers germinated well at 20° or lower and very little at 25° or higher. Buffalo clover germinated well at 25° or lower and decreasingly less at higher temps. In general, the germination of cluster clover decreased at temps. higher than 20°. Persian clover was the least affected by germination temps. Germination of Persian, buffalo and cluster clover at 25° increased for the first 3-5 monthly tests. There was evidence that dormancy was induced by holding the moist seed of low hop clover at a temp, too high for germination. The hard seed content of the unscarified seed was not affected by temp, of germination except for Persian clover which showed a pronounced softening of the hard seeds at the lower temps, especially after 2 and 3 years. One test made on unscarified crimson clover seed 3 months after harvest indicated a low percentage of hard seed and little difference in germination at different temps. An analysis of soil temp. records taken at Columbia, Missouri, indicates that summer soil temps. are of sufficient intensity to inhibit the germination of the species studied with the exception of crimson clover.—Authors.

14000. WATTS, VICTOR M. Rest period in cucumber seeds. Proc. Amer. Soc. Hort. Sci. 36: 652-654. 1938(1939).— Planting of cucumber seeds immediately after harvest resulted generally in low germination percentages, but planting 40 to 50 days after harvest resulted in high germination percentages. The rest period was effectively broken by the removal of the seed coats and planting on moist absorbent

material, in a moist chamber at 30° C.—V. M. Watts.
14001. WOODBURY, GEORGE W. Effects of certain chemicals on apical dominance and rest period of Russet Burbank potatoes. Proc. Amer. Soc. Hort. Sci. 36: 601-604. 1 fig. 1938(1939).—Russet Burbank potatoes, when treated with 4% aqueous solns. of KSCN and thiourea, gave marked increase in sprout production. Evidence of shortening of the rest period was shown in earlier plantings, such differences gradually disappearing until the normal termination of the rest period. Similar treatments, given to seed potatoes planted in the field, increased the number of stems and tubers per hill with a reduction in tuber size. Differences in the field corresponding to those obtained under greenhouse conditions might be expected if tubers were cut before treatment as was the case in the greenhouse-grown material.-G. W. Woodbury.

GROWTH, DEVELOPMENT

14002. CULPEPPER, C. W., and H. H. MOON. Effect of temperature upon the rate of elongation of the stems of

asparagus grown under field conditions. Plant Physiol. 14(2): 255-270. 1939.—Using material grown under varying conditions of temp. in the field a large number of measurements of the changes in the height of the stalks were made, the data thus obtained classified according to height of the stalks and the prevailing temp., the values in each class averaged, and the results plotted so as to show the general relationship between the growth rate and both the temp, and height of the stalk. For temp, between 52.5 and 87.5°F the relationship between temp, and growth rate is almost linear. The rate of elongation approx. doubled with each increase of 10° C over a very limited range of temps. Rate of increase in height was slow at first, increased rapidly to about 65 cm. in height where it was maximum, and then slowly decreased as the stalks became taller. The growthcurves with respect to time were also obtained for the various temps.; they are typical S-shaped curves. Using similar methods the rate of growth in different regions along

the stalk was determined, the rate being greatest in the region a short distance below the tip.—C. W. Culpepper. 14003. LEONIAN, LEON H., and VIRGIL GREENE LILLY. Studies in the nutrition of fungi. II. Effect of incoulum on the growth of the colony. Phytopath. 29(7): 592-596. 2 fig. 1939.—Thiamin and dextrose were used as test substances and Phycomyces blakesleeanus as test organism to determine the possible effect of the inoculum piece upon the growth of the ensuing colony. For all practical purposes the amt. of thiamin or dextrose present in the average size inoculum (3 mm. in diam., 2 mm. thick) is not of significant importance in the initiation and growth of the new colony. One must use 100 times the optimum amt. of thiamin before an inoculum piece of such a size can show even a slight effect, and from 1000 to 10,000 times the optimum before a significant growth results. A disc of agar 5 mm. in diam. and containing 20% dextrose failed to influence growth; a disc 10 mm. in diam. had a significant

effect on growth.—L. H. Leonian.

14004. MAGROU, J. Concentration moléculaire et tubérisation chez la pomme de terre. Compt. Rend. Soc. Biol. 130(12): 1163-1166. 1939.—In aseptic plantlets of Solanum tuberosum having been transported up to the mountain and strongly illuminated during a part of the summer, glucose and glycerol can induce tuberization. Both substances are active in the same molecular concs. with 3 exceptions: 0.4% glucose, 3.06 and 4.08% glycerol. In the controls left in Paris during their whole development glucose still produced tuberization but only at a much higher minimal conc. In high cones. (7-8%) of glucose, tuberization takes place only in the dark.—H. Simons.

14005. NOBÉCOURT, P. Sur la pérennité et l'augmentation de volume des cultures de tissus végétaux. Compt. Rend. Soc. Biol. 130(12): 1270-1271. 1939.—The author was able to maintain growth of carrot tissue cultures (taken from neo-formations of a carrot slice cut aseptically) in his medium containing β -indolylacetic acid for more than 20 months. There is no indication that growth will soon come to an end. During one individual culture 100-fold increase of volume was observed. 7 transplantations into fresh nutrient medium have been made, each of them with 1/20 of the mother culture. Hence the total volume is 20° or $128 \times 10^{\circ}$ times the original volume.—H. Simons.

14006. SOLACOLU, T., MARG. CONSTANTINESCO, et D. CONSTANTINESCO. L'influence des solutions stérilisées de tryptophane sur les plantules isolées de grains mûres et non germées. Compt. Rend. Soc. Biol. 129(27): 403-405. 1938.—Artificially cultured embryos of Phaseolus vulgaris show an increased growth in the presence of tryptophane, but it is irregular and atypical. The effect varies with the length of heating and concentration of the amino acid.— J. T. Myers.

PHOTOSYNTHESIS

14007. INMAN, O. L., and MARIE L. CROWELL. Condition of chlorophyll in the leaf. Plant Physiol. 14(2): 388-390. 1939.—Colloidal triturates of the fresh leaves of Trifolium repens when treated with crude trypsin and Northrup's crystalline trypsin indicated the loss of Mg from the chlorophyll molecules at pH 5.6 and 6.8. The controls did not change. Addition of CO2 to controls and triturates treated with trypsin demonstrated the trypsin had weakened the linkage of Mg in the chlorophyll molecules. The best provisional explanation seems to be that the trypsin acts on a protein-Mg-chlorophyll linkage. Two figures give spectroradiometer curves of some of the chlorophyll absorption bands which show the changes indicated by trypsin and CO₂ plus trypsin.—O. L. Inman.

14008. LOVELL, J. The production of "extra oxygen" from nitrate solution by leaves in light. Proc. Leeds Phil. and Lit. Soc. Sci. Sect. 3(8): 488-491. 1938.—Active, illuminated shoots of Elodea canadensis were used to demonstrate the state of the state strate that more O₂ is produced by green tissues in dilute solns. of KNO₃ than in water. Since the nitrate salt also increases the rate of respiration of the plant by 50% (measured by O₂ consumption in darkness), the method of demonstration requires measurements of O₂ production in light and of O₂ used in darkness. KCl actually lowers the assimilation rate, indicating a specific effect of the nitrate in the production of more O_2 than that formed by photosynthesis. "This effect disappears after the *Elodea* has been stored in the laboratory in running water for about a week" but the rate of respiration shows no such decrease in storage. The method is supposed to demonstrate the type of reduction of nitrate that Warburg and Negelein reported

in 1920.-C. J. Lyon.

14008-14014

14009. McALLISTER, E. D. The chlorophyll-carbon di-oxide ratio during photosynthesis. Jour. Gen. Physiol. 22 (5): 613-636. 9 fig. 1939.—Using a rapid spectrographic method of CO₂ measurement previously described, further studies on the time course of photosynthesis in wheat, var. Marquis, are reported. Of major importance in this work is the discovery of a pick-up of CO₂ in darkness immediately following a high rate of photosynthesis. This pick-up is believed to be due to the action of a CO₂-combining intermediate, i.e., the "acceptor molecule" for CO₂ in photosynthesis. The conditions under which this phenomenon has been observed indicate that the intermediate is formed in relatively large quantities during the actual process of photosynthesis and not before. That the intermediate is chlorophyllous in nature is suggested by a simple stoichi-ometry of the order of unity that is found to exist between the number of CO₂ molecules taken up and the total no. of chlorophyll molecules present in the plant. This is in opposition to the idea of a large photosynthetic unit of some 2000 chlorophyll molecules operating together in the reduction of 1 CO₂ molecule. The fast dark reaction lasting about 1 min. required to reproduce both (a) the phenomena of induction in CO₂ assimilation and (b) the recovery of fluorescence of chlorophyll in leaves in darkness demonstrates a close relationship between the fluorescence of chlorophyll and induction in photosynthesis. The rate of respiration (CO2 production) of wheat was measured under intense illumination and in the absence of CO2 (to suppress assimilation). This value was identical with the dark respirational rate measured before and after the light period, indicating the absence of any direct effect of light on respiration.—Auth. summ.

14010. NEISH, ARTHUR CHARLES. Studies on chloroplasts. II. Their chemical composition and the distribution of certain metabolites between the chloroplasts and the remainder of the leaf. Biochem. Jour. 33(3): 300-308. 1939.— Chloroplasts consist chiefly of protein and lipins. They contain a high percentage of lipins as compared with the rest of the cell. Nearly all the lipin fraction may be extracted with 85% acctone. Cu, Fe, P and NH, salts are concentrated to a certain extent in the chloroplasts. Ca, Mg, Mn, Na, K and Cl show an opposite localization in the cell. SO₄ and NO₅ do not follow any general rule. The Cu in chloroplasts appears to exist chiefly in organic combination. Part of the Fe and P is also combined organically but Ca and Mg are present chiefly in the inorganic state. Most of the catalase in the leaf cells is found in the chloroplasts. Carbonic anhydrase and ascorbic acid are found in appreciable quantities both in the chloroplasts and

in other parts of the cells.—Auth. summ.

RADIATION EFFECTS

14011. GESSNER, FRITZ. Die Wirkung des Lichtes und der ultravioletten Strahlung auf die Pflanzenatmung. Planta 29(1): 165-178. 1938.—The O₂ consumption of fresh-

water aquatic plants is markedly increased by intense visible radiation. This increase may amount to 50% if the plants have previously been dark-adapted during 60 hrs. and if the intense radiation is prolonged for several hrs. One may use daylight for the reaction or lamp light free of u.-v. U.-v alone gives a strong reaction if the plants have been preconditioned. No reaction was obtained from the use of 2460 r units of x-rays.—B. R. Nebel.

14012. POPP, H. W., and F. B. CHARLTON. Effects of ultraviolet radiation upon germination and seeding development.

ment. Pennsylvania Agric. Exp. Sta. Bull. 366. 1-50. 17 fig. 1938.—Long exposures (over 2 hrs.) to the unscreened mercury vapor arc had no effect on dry seeds but reduced the rate and final germination of soaked seeds. Also at 2 min. or less, or at any length exposure through the screens tried, there was no effect on germination of the seeds studied, including white mustard, buckwheat, radish, turnip, cucumber, pigweed, and curled dock. Exposures of 15 min. or more per day at 50 cm. from the unscreened arc proved destructive to seedlings after one or more treatments and were fatal if continued for 10 days. This destructive action was restricted to the region below 300 m μ . Exposures of 2 min. at 50 cm. were less injurious but had a marked formative effect on the seedlings, and the epidermal tissues were injured though the plants were not killed. Plants in the dark were more markedly affected than in the light. Still shorter exposures caused reduced stature but not to so marked a degree. Seedlings exposed 2-4 min. per day were lower in fresh and dry weights and in percentage of moisture than controls, and were lower in total carbohydrates and reducing sugars but somewhat higher in starch. No significant difference was noted between irradiated plants and controls when seedlings were exposed at the same distance at which the unscreened arc was used and for the same time, or under the same total intensity of radiation to the u.-v. region between 300 and 400 m μ , to this region in combination with infrared radiation or to the latter alone. No significantly greater elongation of seedlings was obtained either by extremely short irradiation with the unscreened arc or by short irradiations with any other region of the u.-v. studied than occurred in non-irradiated controls. With longer irradiation the long wave length u.-v. region tended to stunt the plants. In general, both the destructive action and the formative effects on stature and general development decreased with increasing distance from the lamp and with decreased time of exposure. The most notable effect of the u.-v. region of the spectrum was to reduce the stature of the plants, and this effect increased with decreased wave length, with increased length of exposure, and with increased intensity.—Courtesy Exp. Sta. Rec.

14013. SINGH, B. N., R. S. CHOUDHRI, and S. L. KAPOOR. Structural abnormalities in cotton leaves following exposure of the seed to X-radiation. Ann. Botany 3(10): 307-312. 1939.—Dry, soaked, and germinated seeds were exposed to X-rays for 5, 15 and 30 min. and the plants then raised in pot culture under similar conditions. Irradiation of seeds for 5 min. caused some modification in the leaves and this increased with increasing exposure. The effect on leaves of plants raised from dry irradiated seeds was less than with soaked seeds and the germinated seeds showed a still greater effect. Petioles after dry-seed treatment were thicker, while they became grooved in the cases of irradiated, soaked, and germinated seeds. No external change was noticed in the leaf lamina following the treatment of dry seeds. The treatment of soaked and germinated seeds gave an asymmetrical lamina which was variegated and showed puckerings and tumor-like structures. Petioles of normal leaves were cylindrical; with heavy irradiation they became dorsiventral. The conducting tract also changed from several bundles in a ring to a single crescent-shaped mass, and this was associated with greater development of wood. The vascular system of the lamina was markedly affected. Injurious effects were most proposed in the allied approximation of the lamina was markedly affected. nounced in the palisade parenchyma which shows that the different tissues respond differently to irradiation.—Auth.

RESPIRATION

14014. CLAYPOOL, L. L. Internal gas in fruits as influenced by external treatments. I. Carbon dioxide. Proc.

Amer. Soc. Hort. Sci. 36: 374-378. 1 fig. 1938(1939).—A new method is described for determining the total CO₂ in fruits. About 500 g. of fruit is placed in a liter flask containing about 300 cc. of N/10 NaOH. The soln is acidified with conc. H₂SO₄, heated to the boiling point and boiled about 5 min. At the same time CO₂-free air is continuously bubbled through the soln. carrying with it any liberated CO₂, which is re-absorbed by passing the air stream through a intered-glass disk into a standardized NaOH absorption tower. A half cc. of butyl alcohol is used to increase surface tension of the NaOH soln. Tests with fruits stored in atmospheres varying in CO₂ content from nothing to 85% at 32, 40 and 70°F indicate that internal CO₂ bears a close relationship with solubility curves of CO2 in water assuming the fruit to be 85% water. Water emulsions of various waxes used on fruit, temporarily increased the CO₂ content by interfering with gas exchange. In some cases this was later reversed and waxed fruit contained less CO₂ than controls. The sealing ability of the waxes was often more

effective with CO₂ than water vapor.—L. L. Claypool.

14015. GAFFRON, HANS. Über Anomalien des Atmungsquotienten von Algen aus Zuckerkulturen. Biol. Zentralbl. 59(5/6): 288-302. 1939.—The magnitude of the respiration (Qo₂) in cultures of Chlorella pyrenoidosa, C. variegata and 3 spp. of Scenedesmus grown in nutrient medium containing 1.5% glucose was 2 to 8, in agreement with previous results. The RQ however ranged from 0.9 to 2.; the mean was 1.4. The 2 quotients mentioned changed, independently of each other. Under the conditions of the expt. the anomalous RQ value cannot be considered as an abnormal result of metabolism of injury. The problem of acid formation in plant cells is perhaps involved.—A. H. Hersh.

14016. GAFFRON, HANS, Über auffallende Unterschiede in der Physiologie nahe verwandter Algenstämme, nebst Bemerkungen über "Lichtatmung." Biol. Zentralbl. 59(5/6): 302-313. 1939.—Two morphologieally similar stocks of Scenedesmus obliquus behaved differently under the influence of HCN and dinitrocresol. In the one stock HCN acted catalytically to accelerate respiration and assimilation. HCN has both an inhibiting and an accelerating component in its effect on algae,—an effect which is discussed in rela-

tion to photoxidative processes.—A. H. Hersh. 14017. KROTKOV, G. Carbohydrate and respiratory metabolism in the isolated starving leaf of wheat. Plant Physiol. 14(2): 203-226. 1939.—Wheat plants were grown, some in a greenhouse and some in a special constant-temp. and light chamber. When their first leaves entered the stage of early maturity a large number of them were detached and starved under constant conditions, and their respiration and sugar content were closely followed. In such leaves there were 2 respiratory substrates, the primary one being represented by sugars, and the secondary, probably by a variety of substances, some of which are of importance in protoplasmic organization. The manner of depletion of the primary substrate controls the course of starvation metabolism in its early stages; depletion of the secondary substrate guides the metabolic drift in the later stages and finally causes it to terminate suddenly in autolytic disorganization.—G. Krotkov.

14018. MASURE, M. P. Some comparisons of methods of measuring fruit respiration. Proc. Amer. Soc. Hort. Sci. 36: 223-229, 1938(1939).—Comparisons of respiration rates of comparable samples of lemons, run in duplicate, were made from data secured by 3 systems of measurement—(I) the ordinary aspiration system employing KOH and titrimetric determination of the absorbed CO₂, (II) a closed desiccator and oxygen-bottle system in which O2 is automatically replenished as respired, and CO2 detd. titrimetrically from the KOH soln. enclosed, and (III) an ordinary aspiration system employing Ascarite (soda-asbestos) used to determine CO₂ gravimetrically; it was found necessary to include a desiccant with the Ascarite in order to avoid weight decreases due to moisture loss. Respiration rate values for (II) averaged 6% lower than (I), and (III) averaged 8% lower than (I).-M. P. Masure.

14019. PRATT, ERNEST F., and ROGER J. WILLIAMS. The effects of pantothenic acid on respiratory activity. Jour. Gen. Physiol. 22(5): 637-647. 1939.—Using the Warburg-

Barcroft apparatus it was found that 2 yeasts in 3 media were strikingly stimulated in their respiration by minute amts. of pantothenic acid. 9 other compounds (thiamin, β alanine, and other biologically important substances) were tested and found in all cases to have on the deficient G.M. yeast, less and in some cases no appreciable stimulative effect. Thiamin was the most effective of these compounds. Its action was shown to be different from, and in some ways antagonistic to, that of pantothenic acid. Liver extract was found to contain substances capable of speeding up respiration and growth to a much higher level than seems possible with known compounds. Pantothenic acid had a stimulative effect on fermentation by dialyzed maceration juice from yeast, it stimulated respiration of apple and potato tissue and there were indications of a similar effect on animal tissues.—Auth. summ.
14020. VICKERY, HUBERT BRADFORD, and GEORGE

W. PUCHER. The loss of carbon from excised rhubarb leaves during culture. Jour. Biol. Chem. 128(3): 685-702. 1939.—Analysis of a series of initially identical samples of rhubarb leaves, after culture in water in darkness, in water in light, or in water in 0.3 M glucose soln., for various periods of time up to 261 hrs., permitted conclusions to be drawn with respect to the changes that occurred in certain of the components. The data for the organic acids and amides have been given in previous papers [see B. A. 12 (10): entires 15782, 157891. In the present paper, the data for the total C and the C rasoluble in hot diluted alcohol and hot water any interpreted in towns of the changes the and hot water are interpreted in terms of the changes that occurred in many of the known components as well as in groups of components of allied solubility but of unspecified chemical nature. The losses of C are attributed to respiration; this process draws upon components other than simple carbohydrates even when leaves of reasonably high initial carbohydrate content are examined. With leaves of low initial carbohydrate content, the protein of the leaf blade supplied an appreciable part of the C lost by respiration. It is assumed that the amino acids produced by protein hydrolysis are deaminized and that the residues are subsequently more or less completely oxidized. Culture in water in light or even in glucose soln, in darkness had little effect upon the rate of protein decomposition and even in these circumstances loss of protein carbon by respiration was observed. The results are in general agreement with speculations advanced by Gregory and Sen (Ann. Bot. 1: 521. 1937) with respect to the interrelationship of proteins, organic acids and carbohydrates with the respiration of the tissue.—H. B. Vickery.

PROTEIN METABOLISM

14021. CHIBNALL, ALBERT CHARLES. Protein metabolism in the plant. xiii + 306p. 9 pl., 21 fig. Yale University Press: New Haven, 1939. Pr. \$4.—This volume is based on the lectures presented by the author at Yale Univ., and is the 27th in the series published on the Silliman Foundation. The dedication is to Thomas Burr Osborne. Special acknowledgments are made to H. B. Vickery, F. G. Gregory, and J. W. H. Lugg. Portraits are presented of Vauquelin, Piria, Boussingault, Pfeffer, Ritthaussen, I. Borodin, v. Gorup-Resanez, Prianischnikow, and E. Schulze. The chapter headings are: protein metabolism in seedlings (historical review and review of later literature), asparagine and glutamine formation in seedlings, the mechanism of amino acid and protein synthesis in plants, the preparation of proteins from leaves, the proteins of pasture plants, protein metabolism in leaves, the rôle of proteins in the respiration of detached leaves, the regulation of protein metabolism in leaves. The 3 sections in the appendix are: the impurities present in leaf-protein preparations and their bearing upon the estimation of some amino acids, particularly in relation to the formation of humin during acid hydrolysis (by J. W. H. LUGG); the estimation of nitrogenous bases, dicarboxylic acids and amide N in the impure leaf-protein preparations; the lipoid fraction of chloroplasts. There are 377 citations in the bibliography, references to 1938 literature being included. The double column index occupies 10 pages.—F. E. Denny.

14022. VICKERY, HUBERT BRADFORD, and GEORGE W. PUCHER. The metabolism of amides in green plants. III,

The mechanism of amide synthesis. Jour. Biol. Chem. 128 (3): 703-713. 1939.—The speculations of Krebs and Johnson (Enzymologia 4: 148. 1937) advanced to account for the respiration of carbohydrates in the animal cell have been applied to plant tissues by Chibnall who has added hypothetical relationships to fats and to amino acids which show how these substances may also become involved in the respiration. This scheme provides chemical mechanisms whereby oxaloacetic and a-ketoglutaric acids may arise in plant tissues from several different sources. These 2 acids are regarded as the immediate precursors respectively of the amides asparagine and glutamine. The production of amides under various conditions thus depends not only on the supply of ammonia but also on the supply of the 2 precursors. These in turn arise in the course of the respiration. It is suggested therefore that amide formation is a function of the respiration rather than of the ammonia conc. as has been supposed by Prianischnikow. This conception permits of a logical explanation of the behavior of the amides in normal tobacco leaves and also in tobacco leaves that contain a high proportion of ammonium ions brought about by growth of the plants on special ammoniacontaining culture solns. In these leaves, as well as in rhubarb leaves, which normally contain unusually high proportions of ammonium ions, the "ammonia detoxication" hypothesis of Prianischnikow fails to account for the behavior of the amides when the excised leaves are cultured in water or nutrient solutions either in light or in darkness. -H. B. Vickery.

LOW TEMPERATURE, HARDINESS

14023. CARROLL, J. C., and F. A. WELTON. Effect of heavy and late applications of nitrogenous fertilizer on the cold resistance of Kentucky bluegrass. Plant Physiol. 14
(2): 297-308. 1939.—Artificial refrigeration of hardened grass showed the high-N grass to have a much lower cold resistance than the low-N grass. No difference in cold resistance was noted in the case of unhardened grass. Physico-chemical determinations of constituents generally associated with cold resistance gave a positive correlation between high cold resistance and high bound water, high sugar, low N, and low moisture content. The differences between the lowand the high-N grass in these constituents were statistically significant.—F. A. Welton.

14024. CLEMENTS, H. F. Studies in drought resistance of the soy bean. Res. Stud. State Coll. Washington 5(1): 1-16. 5 fig. 1937.—The capacity of soybean plants to resist drought in the field was studied, the growth rates observed under conditions of normal and of greatly reduced rainfall, respectively, together with a correlation of their chemical composition under the 2 conditions serving as the basis. Growth was reduced under drought conditions, although in other respects the plants were similar in outward appearances. The hemicellulose content of the drought-resistant plants was much higher than that of plants grown under more optimum conditions. The soluble sugars appeared to show no response to drought. Starch was more abundant under the unfavorable growth conditions, believed to be an indication that although the drought did not seem to reduce photosynthesis it did slow up the translocation of materials. N metabolism was maintained at a higher level during drought than during normal conditions, even though growth was reduced. A mechanism of drought resistance is suggested.—Courtesy Exp. Sta. Rec.

3 14025. CLEMENTS, H. F. Mechanisms of freezing resistance in the needles of Pinus ponderosa and Pseudotsuga mucronata. Res. Stud. State Coll. Washington 6(1): 3-45. 29 fig. 1938.—Water content of the needles was highest in midwinter and lowest when the needles were changing from winter to spring conditions. The young needles had the highest moisture content, and the old the lowest. In general, pine needles had higher water content than Douglas fir. These results correlated rather well but inversely with lowtemp. resistance. In completely developed needles the total N (mostly insoluble) based on residual dry weight showed no essential variations in relation to season or age, and no marked variations in the soluble N fractions were found which could be correlated with winter temp. The carbohydrates showed striking variations and correlations with

both age and season. The soluble sugars were at maxima during the coldest part of winter, and a 2d accumulation was correlated with rapid synthesis in spring and early summer. The highest concs. of sugars were found in the oldest needles, and the fir needles contained considerably more than the pine. The sugars apparently play a major rôle in low-temp, resistance. Starch was abundant during rapid synthesis, scanty at other times. The more permanent acid-hydrolyzable materials seemed also to be involved in the resistance mechanism. Fatty materials showed a strong correlation with winter temps. The rôles which may be played by these various materials are fully discussed, with special reference to the mechanism of freezing resistance. Courtesy Exp. Sta. Rec.

14026. POTAPOV, P. E. Intessivnost dykhania v swiazi s zimostokostin ozimych pshenytz. [Intensity of respiration in relation to the hardiness of winter wheat.] Selektzia i Semenovodstvo [Plant Breeding and Seed Growing] 9(1): 25-27. 1939.—During the winter-spring period, non-hardy wheat vars. respire more intensely than vars. of medium hardiness, and hardy vars. do not respire as intensely as vars. of low or medium hardiness. With the lowering of temp., the water content is lowered. With the advance of spring and with the accompanying higher temp., the respira-tory rate and moisture percentage increase. The hardiest winter wheat vars., and those that have the least respiratory energy, have less moisture. Medium hardy vars, of winter wheat having greater respiratory energy have more moisture than the hardy vars. The non-hardy vars. of wheat or those with very low hardiness have the highest respiratory rate and a high moisture content. The respiratory rate and moisture content in the live cells of the same var. and during same period is higher if snow-holding is practiced than where only natural snow is on the land. The respiratory rate and the percentage of moisture are greater in hardy winter vars. Iarovised wheat plants respire more rapidly and also contain more moisture than non-iarovized plants.-J. W. Pincus.

14027. WALTMAN, C. S. Phosphate phosphorus and soluble nitrogen changes in living and winter killed peach twigs. Proc. Amer. Soc. Hort. Sci. 36: 181-184. 1938(1939). Chemical determinations for phosphate-P and nitrate-N were made on twigs of peach trees following severe winter injury to the wood, and were continued up to the time that the trees were found to have been killed. Following the severe temps, of -18 and -20° F the phosphate-P content of twigs began to increase and continued to show accumulations up to the time the trees were removed. Increases of more than 100% were found in these trees over the amts. found in a normal season. An increase in soluble N also occurred but less than for phosphate-P. In one tree which suffered less injury and made fairly good growth when spring weather came, accumulations of P and N did not occur as in more severely injured trees.—C. S. Waltman.

ENZYMES

14028. HELFERICH, BURCKHARDT, RUDOLF HILT-MANN, und WOLFGANG REICHEL. Die fermentative Spaltung von Bis-glucosiden zweiwertiger Alkohole und Phenole. Justus Liebig's Ann. Chem. 534(2/3): 276-282.

14029. KAWASAKI, OSAMU. Studies on tyrosinase. III. The effect of the addition of various salts on the potato tyrosinase. Jour. Biochem. [Tokyo] 28(3): 383-403. 18 fig. 1938.—The potato tyrosinase was purified successively by precipitation with alcohol, by adsorption with Al(OH)3suspension C_r and electrodialysis. In expts. with these enzyme preparations, the author studied the effect of the addition of various salts on tyrosinase action. The optimum pH-activity range of tyrosinase is wide (opt. pH 7-9). No appreciable difference in the optimum pH was observed in the expts. with 3 enzyme preparations of different purity. At reactions more alkaline than pH 11 or more acid than pH 4 tyrosinase is rapidly inactivated. The optimum temp. for the tyrosinase action is 35-40° C. KCN, AgNO₃, HgCl₂, MnCl₂, K₃Fc(CN)₆ and KMnO₄, inhibit the action of tyrosinase; FeSO₄, K₁Fe(CN)₆ and FeSO₄(NH₄)₂SO₄ activate it. Thibition by KCN takes place only in all all incomparisons. Inhibition by KCN takes place only in alkaline reaction,

and is due to the liberation of HCN from the acid reaction mixtures by shaking in the Warburg vessel. The activation of tyrosinase by FeSO₄, K₄Fe(CN)₆ and FeSO₄(NH₄)₂SO₄ occurs mainly in acid reaction. The depression of tyrosinase activity by MnCl₂ is dependent on MnCl₂ conc. At pH 7.38 the addition of M/4400 MnCl₂ always causes the maximum inhibition, irrespective of the amount of enzyme added or the purity of the enzyme preparations employed.—Auth.

14030. LOUSTALOT, A. J. The influence of certain nutrient conditions on catalase activity of apple seedlings. Proc. Amer. Soc. Hort. Sci. 36: 239-242. 1938(1939). McIntosh seedlings growing in sand were subjected to various nutritional treatments. Catalase activity of the leaf tissue was detd. at various intervals throughout the expt. A deficiency of either N, P or K tended to reduce catalase activity. Lack of N had the most profound influence in depressing the cativity of the converse A residence. ence in depressing the activity of the enzyme. A rapid increase in catalase activity resulted shortly after N, P and K were supplied to plants deficient in these elements.-A. J. Loustalot.

14031. VOSS, W., und G. BUTTER. Über die fermentative Spaltung von Xylan. 3. Über Studien zum Verholzungsproblem. Justus Liebig's Ann. Chem. 534(2/3): 161-185. 1938.—Enzyme prepns. from barley-malt and snails (Helix pomatia) and "Luizym" (prepared by the Luitpold-Werk in Munich) were used. Xylan was transformed into colloidal solns, that could be easily obtained through electrodialysis of the alkaline aqueous solns. The soln, of l.l. xylan from cherry-stones became opalescent after the dialysis, the corresponding s.l. xylan was still transparent; the prepns. from plum stones and beech logs were opaque. The expts. showed that the splitting of the xylan depends upon its origin and is independent of the methods of preparation. The quotients 3:1 and 2:1 for the relation cellulose: s.l. xylan may be recognized in the properties of the xylan. There are important differences in the possibility of splitting 1.1. and s.l. xylan; s.l. xylan is decomposed much slower and in smaller amounts. The possibility of splitting is directly proportional to the contents of hexuronic acids. Enzymic cleavage reveals smaller structural differences of the xylans than are revealed by the determination of the specific rotation.—M. Neuhof.

14032. VOSS, W., und G. BUTTER. Über die Kinetik der enzymatischen Xylanspaltung. 4. Über Studien zum Verholzungsproblem. Justus Liebig's Ann. Chem. 534(2/3): 185-204. 3 fig. 1938.—(Thesis G. Butter at the Technische Hochschule in Breslau, 1937). During the fermentative splitting of xylan an increasing inhibition of the reaction occurs that can not be explained in the formation of xylose alone, but is mainly due to the weakening of the enzyme. The weakening is more intensive with s.l. xylan than with 1.1. xylan. The several ferment preparations show a different behavior on storage. Luizym (prepared by the Luitpold-Werk in Munich) shows a greater decrease of its effect, no matter if it is dialyzed or not, than the enzyme from Helix pomatia which loses some of its effectiveness in the beginning and then remains constant; a 5 year old

snail—enzyme prepn. was nearly as effective as a freshly prepared one.—M. Neuhof.

MISCELLANEOUS

14033. JOHNSTON, C. N., and O. A. ATKINS. An automatic plant irrigator and recorder. *Plant Physiol.* 14 (2): 391-393. 1 fig. 1939.—This describes a piece of easily made automatic equipment for the use of investigators desiring to maintain uniform soil moisture conditions within potted containers. The irrigator is so designed as to give assurance that all soil in the pot will be returned to field capacity moisture content after the plant has withdrawn any prescribed amount of water. It records the number of irrigations.—C. N. Johnston.

14034. MEYER, BERNARD S., and DONALD B. ANDER-SON. Plant physiology. A textbook for colleges and universities. x+696p. 151 fig. D. Van Nostrand Co., Inc.: New York, 1939. Pr. \$4.50.—This textbook is designed for use in short, introductory courses having prerequisites of general botany and chemistry. All phases of the subject are treated as it applies to green plants but the treatment is concise and organized rather than encyclopedic. Plant processes are interpreted on the basis of modern physics and chemistry and the principles of these sciences that apply particularly to plant physiology are reviewed in the earlier chapters. Such topics as solution, adsorption and colloids are explained without reference to plant tissues but cells and protoplasm are made the point of reference for matters like osmosis, permeability and imbibition. Following these discussions of the basic mechanics of living plants and their immediate environment of air and soil, the next twelve chapters deal chiefly with the chemical problems of nutrition and metabolism. The sequence of the principal topics is: photosynthesis, carbohydrate metabolism, fat metabolism, mineral nutrients, nitrogen metabolism, digestion, translocation and respiration. The last 7 chapters are devoted to growth and tropisms, covering a wide range of topics like meristems, growth curves, auxins, control by external factors, dormancy and periodicity. At the end of each chapter there is a list of collateral readings and a selected bibliography of journal references. For most of the chapters there is also a set of discussion questions, chiefly of the "problem" type. The text figures are almost entirely original diagrams and graphs of data from original sources. Other data to illustrate and supplement the discussion are provided in 60 tables distributed throughout the book.—C. J. Lyon.

14035. MILLER, ERSTON V., and HAROLD A. SCHOMER. Physiological studies of lemons in storage. Proc. Amer. Soc. Hort. Sci. 36: 432-434. 1938(1939).—California lemons were stored at 32, 36, 40, 50 and 60° F and analyzed for sugar, acid, glycosides, acetaldehyde and reductase activity. No relationship was found between these substances and the incidence of physiological disorders except in the case of reductase. Low reductase activity was shown by the peel of fruit stored at the temps. most conducive to development of pitting (40, 36, 32° F). Reductase activity was expressed as the time rate of reduction of standard KMnO₄ soln.—E. V. Miller.

PHYTOPATHOLOGY

FREEMAN WEISS, Editor

(See also in this issue Entries 12472, 12522, 12539, 12562, 13730, 13732, 13735, 13803, 13807, 13841, 13864, 13876, 13877, 13879, 13882, 13903, 13905, 13915, 13916, 13980, 14003, 14112, 14126, 14149, 14218, 14267)

DISEASES CAUSED BY FUNGI

14036. BAINES, R. C., and GEORGE B. CUMMINS. Anthracnose of Lippia. Phytopath. 29(7): 654-656. 1 fig. 1939.—Sphaceloma lippiae is described on Lippia lanceolata in Indiana.—G. B. Cummins.

14037. BAKER, R. E. D. Citrus scab disease on grape-fruit in Trinidad. Trop. Agric. [Trinidad] 15(4): 77-79. 1938.—There is strong evidence for belief from the results of inoculation expts., from the study of the fungus in pure culture, and from field observations; that the grapefruit strain of Elsinoe fawcetti is a mutant from the sour orange strain.-W. D. Pierce.

14038. BAKER, R. E. D. Red root disease of limes in the British West Indies. Trop. Agric. [Trinidad] 15(5): 105-108. 1938.—The exact status of Sphaerostilbe repens as a primary parasite of the seedling West Indian lime is still in doubt. In Trinidad there is an unexplained root disease of the sour orange. The citrus root weevils, Diaprepes spp., by their injury to the citrus roots are an important factor in admitting fungus attack.—W. D. Pierce.

14039. BIER, J. E. Hypoxylon canker of maple. Forest. Chron. 15(2): 122-123. 1 pl. 1939.—A canker disease associated with Hypoxylon, probably H. blakei, was found in 1937 on 10- to 15-yr.-old Acer rubrum and A. saccharum at the Petawawa Forest Exp. Sta., Ontario. The appearance and progress of the disease are descr.—W. N. Sparhawk.

14040. GOTTLIEB, MANFRED, and KARL D. BUTLER. A Pythium root rot of cucurbits. Phytopath. 29(7): 624-628. 1 fig. 1939.—A watery root and fruit rot of watermelons, honeydew melons, quil muskmelons and crookneck squash occurring under natural conditions in Arizona was found to be caused by Pythium aphanidermatum. Studies pertaining to the growth and reproduction of the fungus on various culture media are reported. The optimum temp. for mycelial growth was about 37° C. Sporangial production was meager and transient, being induced only with difficulty in various liquid media near pH 5.4. Oogonia and oospores were produced in great but varying abundance in culture media and on various fruits and vegetables which were artificially inoculated. Positive root infections were obtained both in the greenhouse and in the field from inoculations. The fungus penetrated uninjured root and fruit tissues in practically all cases studied.—Authors.
14041. HADDOW, W. R. The disease caused by Trametes

pini (Thore) Fries in white pine (Pinus strobus L.). Trans. Roy. Canad. Inst. 22(1): 21-80. 1 pl. 1938.

14042. HEMMI, T., and J. IKEYA. Studies on Lenzites

gibbosa (Pers.) Hemmi n. comb. causing wood-rot of deciduous trees. [In Jap. with Eng. summ.] Ann. Phytopath. Soc. Japan 9(1): 1-15. 2 pl. 1939.—The shape of the orifices of tubes is variable, not only on the different individuals, but also on the different portions of the same sporophore. According to the view that the lamellate form is more highly evolved than the trametoid or other forms, the senior author applied the new name Lenzites gibbosa to the present fungus, the following being synonyms: L. tenuis Lév., L. earlei Murrill, Boletus senuosus Sow., Daedalea gibbosa Pers., and Trametes gibbosa (Pers.) Fr. The fungus is widely distributed throughout Japan from Hokkaido to Formosa. The wood of deciduous trees affected by this formosa. The wood of deciduous trees anected by this fungus becomes soft and light, changing uniformly to whitish color. According to the macroscopic changes in decayed wood and to the color reaction in cultures by Bavendamm's method, the authors conclude that the fungus belongs to Falck's "Korrosionspilze" or "Ligninzersetzer" which cause a white spongy wood rot. Temp. relations of mycelial growth of the fungus in plate-cultures of vegetable media were studied. Vigorous growth was obtained at 28° and 32° C, the opt. being slightly above 28° C.-Y. Tochinai.

14043. HIRT, RAY R. A progress report on laboratory tests of the relative durability of different varieties of black locust subjected to certain wood decay fungi. Jour. Forest. 36(1): 53-55. 1938.—Following 5 mos. exposure to cultures of Polyporus robiniophilus, Fomes igniarius, Poria incrassata, and F. rimosus, blocks of Robinia pseudoacacia v. rectissima showed significant wt. loss (2.31%) only from P. incrassata attack. R. peudoacacia suffered decay from each fungus, ranging from 2.24% wt. loss from F. igniarius

to 33.32% loss from P. incrassata.—A. G. Hall.

14044. MIDDLETON, JOHN T. Infection of tomato and red clover with conidia of Pleospora lycopersici and Macrored tover with condit of Piecspora lycopersici and macrosporium sarcinaeforme. Phytopath. 29(6): 541-545. 2 fig. 1939.—The imperfect stage of P. lycopersici, causal agent of a tomato fruit rot, has been designated by El. and Em. Marchal as Macrosporium sarcinaeforme, the causal agent of a leaf spot of red clover. A series of expts. were devised to test the pathogenicity of P. lycopersici from tomato and M. sarcinaeforme from red clover, to tomato and various legumes. Conidia of P. lycopersici were capable of infecting leaves and flowers of tomato upon inoculation; no infections were obtained when red clover, white clover, alsike, alfalfa and white sweet clover were inoculated. Conidia of M. sarcinaeforme infected the various legumes upon inoculation; no infection of tomato was obtained. In addition to slight microscopic peculiarities, marked differences exist in the growth habits of the 2 fungi. Differences in the cultural characters and the pathogenic capacities of the 2 fungi prohibit the application of the binomial M. sarcinaeforme to the imperfect stage of P. lycopersici. J. T. Middleton.

14045. NIJDAM, F. E. Over het voorkomen van Botrytis anthophila (Bond) bij inlandsche klaver. [The presence of B. anthophila on native red clover.] Tijdschr. Planten-

ziekten 45(3): 121-124. 2 fig. 1939.—The presence of Botrytis anthophila on red clover was reported in 1932. The life history of the fungus is given. Inoculation expts. resulted in very few infections. In some crossings the disease reappeared after 3 generations. The disease was probably present during this time but escaped observation, some of the spores having been adjacent to healthy pollen. H. L. G. de Bruyn.

14046. SPRAGUE, R. Soil-borne cereal diseases in coastal Oregon. Northwest Sci. 12(4): 74-80. 1938.—Hay oats is attacked by a complex of soil-borne fungi thriving in the acid soil of this humid region. The most serious disease is due to Fusarium culmorum, but Helminthosporium sativum, H. avenae, Rhizoctonia sp., Ophiobolus graminis, and other fungi are found associated. The Helminthosporium spp. are considered weakly or doubtfully parasitic. but Rhizoctonia sp. is a very active parasite. Wheat, barley. and spelt are also parasitized by all these fungi except H. avenae. Winter cereals are not considered adapted to the lighter, very acid coastal soils, although Oregon Grav (Winter Turf) and Support cats proved feasible in some places. Fulhio wheat can be grown for grain, but most other wheats and all barleys have proved mainly unproductive. Spring-sown oats varied in resistance to Fusarium root rots, but further data and cooperative studies must determine the best ones to grow. Schoolmam, an oat var. grown primarily for grain and resistant to crown rust, proved susceptible to root rots and should be replaced if hay oats resistant to both disease types are developed.—Courtesy Exp. Sta. Rec.

14047. STANDEN, J. H. Prevalence of Basisporium gallarum in arrested axillary shoots and secondary ears of maize. Phytopath. 29(7): 656-657. 1939.—Arrested axillary shoots of maize were infected to the extent of 42.3% in field samples in 1937, and 80.59% in 1938. Secondary ears are much more frequently infected than primary ears. Infection in secondary ears is favored by poor development.—

J. H. Standen.

14048. THOMAS, EUG. A. Über die Schweizer Douglasienschütte. Schweiz. Zeitschr. Forst. 90(2): 55-62. 1 fig. 1939.—The "Swiss Douglas fir leaf cast," Phaeocryptopus (Adelopus) gäumanni, is a serious disease of Douglas fir in Switzerland, where it was discovered in 1925. Since then it has spread throughout the country and into Austria and Germany. It has also been found in England, where it appears to be less destructive, but has not been reported from America. Vigorous as well as unthrifty trees are attacked, and no form of Douglas fir appears to be immune.—W. N. Sparhawk.

14049. ULLSTRUP, A. J. The occurrence of the perfect stage of Rhizoctonia solani in platings of diseased cotton seedlings. Phytopath. 29(4): 373-374. 1 fig. 1939.—Cotton seedlings showing hypocotyl lesions, and wilting of young leaves and petioles were surface sterilized and plated out on tap-water agar. After 2 days of incubation at 27°-29° C mycelium of R. solani was observed growing from the plated tissues. 4 days after plating grayish-white pulverulent areas were evident on and immediately adjacent to the seedling pieces. Microscopic examination of these areas revealed basidia and basidiospores to be present. The size, shape, and appearance of these structures were typical of those described for Corticium vagum. Mycelial, monospore, and multispore transfers were made to water agar containing portions of disease free, surface sterilized cotton seedlings. Only the multisporous transfers reproduced the perfect stage; the mycelial and monospore transfers gave rise to the sterile or imperfect stage.—A. J. Ullstrup.

14050. WEISE, R. Über die durch Fusarium culmorum

(W. G. Sm.) Sacc. hervorgerufene Spargelfusskrankheit. Zeitschr. Pflanzenkr. 49(1): 15-40. 4 fig. 1939.—Since 1929 foot rot, caused by Fusarium culmorum, has spread through the asparagus districts of Saxony in Germany until an average of 5% of all plants were affected in 1937. Foot rot attacks the older plants and is usually associated with wounding. It appears about the end of June and spreads rapidly during the hot moist weather of July and Aug., when the short and weak diseased plants may turn yellow in 8-10 days. Soils of the asparagus districts are loose, fine sands, lacking in humus and with a limited water-holding

capacity, deficient in K and P but with sufficient Ca. Their pH is about 6.7-7.3. The cultural practice is to hill the asparagus plants 30-40 cm. high and allow the tender stalks to push through the sand hill. The most common primary infection is on the stems within the hill, from which the fungus spreads 10-15 cm. beneath the soil surface, colors the stems deep carmine red, and rots their interiors to a pulpy mass. In other cases the attack begins at the surface of the hill and as the disease spreads the underground parts rot and those above ground darken and have small red pustules, about which mycelium develops in moist, warm weather. Sometimes the rootstocks are first attacked and infection spreads from there. Pure, single spore or single hyphal cultures were identified as Fusarium culmorum. single hypital cuttous were included as F usurvan cuttour, not as F. culmorum var. cereale. Healthy asparagus plants inoculated in various ways with pure cultures of F. culmorum became diseased. With injury, attack of all plants was almost certain. Hyphae are usually intercellular and invade the vascular bundles, but their injurious effect seems to be due to a toxin rather than to plugging of the vessels. In water extract of mycelium or a diluted nutrient soln. in which the fungus had been cultured, cut plants wilted within a week, while check plants remained fresh in unused nutrient soln. The fungus grows most rapidly at 20-25°C. Temps. in asparagus hills influence infection and in turn are affected by the moisture of the hills. In summer the average temps. 10-15 cm, within the moist, sandy hills are 20 to 27°C and favorable for disease. The surface temp. of the hill often goes above 30°C in summer, and consequently the fungus lives there only when rains and cloudy weather keep the surface layers wet and cool. During the fall, however, temps within the hill generally are below 15°C, too low for the best development of the fungus; while at the hill surface they are 20-27°C and favorable for infection of the stems at ground level. The disease may be reduced to about 1 or 1.7% if the asparagus hills are removed, by hand workers or by horse team, when the fields are weeded soon after the last harvest. Infected stubble should be removed soon after harvest and not left in the field until the next spring. It is not advisable to plant asparagus on land that has been used for asparagus for 15-20 yrs. There are no resistant vars. at present, and chemical treatment of the soils is not feasible as a control measure, because the fungus is resistant to the effects of CuSO₄, Ceresan, Germisan, Abavit, Fusariol, and the Asand Hg-containing Uspuluns.—H. Hart.

DISEASES CAUSED BY BACTERIA

14051. ARK, P. A., and C. M. TOMPKINS. Bacteriosis of tuberous begonia. *Phytopath*. 29(7): 633-637. 2 fig. 1939. —The authors reported a leaf spot on tuberous begonia (Begonia tuberhybrida) grown in lathhouse nurseries in California under conditions of high atmospheric humidity and relatively high temps. 13 spp. and vars. of begonia were found to be susceptible when inoculated with a pure culture of the organism. The causative organism is considered to be *Phytomonas begoniae*. Control of air humidity and temp, are suggested in order to minimize the damage from the disease.—P. A. Ark.

14052. NABELEK, V. Apfelduft fördert Pflanzenkrebs. Zeitschr. Krebsforsch. 48(5): 391-399. 8 fig. 1939.—In earlier expts. the author had found that exposure of seedlings (Helianthus) to the emanation from an apple caused a cessation of their growth. In an investigation of the possible effects of the emanation on the growth of plant tumors, Helianthus seedlings were similarly exposed after their inoculation with *Phytomonas tumefaciens*, by placing an apple under the bell jar in which they were cultivated. The seedlings themselves showed the usual cessation of growth, but growth of the tumor tissue was stimulated.-H. E.

Eggers.14053. PARK, MALCOLM, and M. FERNANDO. The relative resistance of some tomato varieties to bacterial wilt (Bacterium solanacearum E.F.S.). Trop. Agric. [Ceylon] 91(6): 333-337. 1 fig. 1938.—Tests were made of the resistance of 8 vars. of tomatoes none of which gave better performance than just under 50% mortality.—W. D. Pierce.

14054. TAKIMOTO, S. Bacterial plant diseases in Japan.

VII. Studies on the bacterial spot of tomato. [In Jap. with Eng. summ.] Ann. Phytopath. Soc. Japan 9(1): 23-32. 3 fig. 1939.—In tomato districts in Korea the disease caused by Bacterium vesicatorium is destructive. The disease appears on the seedlings in April and its greatest spread occurs in June and July. The greatest loss occurs on dry soil poor in organic matter. Infection takes place through the stomatal openings. The bacteria overwinter either in soil or in affected plant parts. Effective control is obtained by seed disinfection with 1:1000 to 1:3000 soln. of HgCl₂ and by spraying 2-3 times with 3-2-75 or 3-2-90 bordeaux mixture.—Y. Tochinai.

14055. WILSON, EDWARD E., and WM. B. HEWITT. Host organs attacked by bacterial canker of stone fruits.

Hilgardia 12(4): 249-255. 3 fig. 1939.—The less common symptoms of bacterial canker, Phytomonas cerasi, occurring on leaves, blossoms, fruit, fruit stems, green shoots, and buds of Prunus spp. are discussed in their relation to severe outbreak of the disease. Infection of leaves, fruits, fruit stems, and green shoots, commonly arising from bacteria originating in bud and twig lesions, has not contributed to the severity of the epidemics. Blossom and bud infection are often serious and frequently develop concurrently with disease outbreaks in large limbs. Similarities between this disease and a bacteriosis of stone-fruit trees in England

are mentioned.—E. E. Wilson.

14056. WILSON, EDWARD E. Factors affecting development of the bacterial canker of stone fruits. Hilgardia 12 (4): 257-298. 3 fig. 1939.—Changes occurring in the activity and extension of cankers of the bacterial disease of stonefruit trees caused by Phytomonas cerasi are described in relation to time. Interval inoculations into limbs of Prunus spp. have revealed a marked seasonal activity of the cankers. Expts. were performed to determine how various factors, including those of the external environment and those within the tree, affect the activity of cankers. Temp. markedly influenced canker activity during the winter. Effect of soil fertilization was less striking. Soil moisture when reduced below the wilting percentage appeared to influence somewhat the activity of the bacteria in inoculated trees. Vars. of plum trees varied greatly in their susceptibility. Internal reactions of the host to presence of diseased areas were considered from the standpoint of possible effect on progress of cankers. Exptl. data indicated a certain relation between occurrence of periderm around diseased area in the bark of plum trees and cessation of canker activity, but failed to prove that the periderm prevented canker activity.—E. E. Wilson.

VIRUS DISEASES

14057. BLANTON, F. S., and F. A. HAASIS. Transmission of the narcissus mosaic virus by aphids. Jour. Econ. Ent. 32(3): 469-470. 1939.—The virus causing narcissus mosaic has been transmitted from diseased to healthy narcissus plants by the following aphid species: Aphis rumicis, Illinoia solanifolii, Macrosiphum rosae and Myzus

convolvuli.—F. A. Hassis.

14058. CHATTERJEE, N. C. Entomological investigations on the spike disease of sandal (33) Heteroptera (Hemipt.). Indian Forest Rec. Ent. Ser. 3(11): 213-225.
1938.—This paper records 4 spp. of Pyrrhocoridae, 1 of Aradidae, 3 of Tingitidae, 1 of Hydrometridae, 7 of Phymatidae, 7 of Capsidae, 1 of Pelogonidae and 1 sp. of Notonectidae frequenting the foliage of Santalum album, collected by the Forest Research Institute survey of the insect fauna of that tree in North Salem, Vellore, Madras and North Coorg forest divisions, S. India.—Auth. abst. 14059. COOK, MELVILLE T. Second supplement to

host index of virus diseases of plants. Jour. Agric. Univ. Puerto Rico 22(3): 411-435. 1938.—A continuation of previous work published in this Journal. It contains a list of virus diseases on more than 250 spp. in 42 families of plants.— $M.\ T.\ Cook.$

14060. COOK, MELVILLE T. Second supplement to the index of vectors of virus diseases of plants. Jour. Agric. Univ. Puerto Rico 22(3): 437-439. 1938.—A list of 21 spp. of insect vectors.—M. T. Cook.

14061. COOK, MELVILLE T. The witches' broom of Tabebuia pallida in Puerto Rico. Jour. Agric. Univ. Puerto

Rico 22(3): 441-442. 1 pl. 1938.—A brief discussion of expts. to demonstrate that this disease is caused by a virus which can be transmitted during the active growing season.—
M. T. Cook.

14062. COOK, MELVILLE T. Cucumber mosaic in Puerto Rico. Jour. Agric. Univ. Puerto Rico 22(3): 443-447. 1 pl. 1938.—Mosaic leaves and chlorotic portions are thinner than normal parts, Palisade cells in chlorotic portions may fail to elongate. Chloroplasts are larger and more numerous in normal parts. In fruits the size differences in cells were slight but the number of chloroplasts was reduced in the infected areas

14063. JOHNPULLE, A. L. Chilli leaf-curl experiments. 1. Preliminary infection tests. Trop. Agric. [Ceylon] 92 (1): 28-30. 2 pl. 1939.—Field plants of Capsicum frutescens affected with leaf-curl were found to be infested by thrips, aphids and mites. Plants in pots were sprayed to kill all insects and covered with cloth to exclude insects except those introduced. In the caged plants the first symptoms of leaf-curl were noted in the pots containing thrips about a week after introduction. The control plants remained completely healthy.—W. D. Pierce.

14064. KAWAI, I. On the intracellular bodies associated

with the dwarf disease of mulberry trees. [In Jap. with Eng. summ.] Ann. Phytopath. Soc. Japan 9(1): 16-21. 4 fig. 1939.—Intracellular bodies were found in epidermal and mesophyll cells of the leaves of dwarfed plants. In most cases a single body occurs in close contact with the cell nucleus, but sometimes 2 are found in the same cell. The bodies are usually oval or round, occasionally irregularly shaped, $4.5-13.5 \times 4.5-6~\mu$. They consist of an apparently homogeneous substance surrounded by an indistinct membrane, and contain many vacuoles varying in size. The author regards the mulberry dwarf disease as of virus nature.-

Y. Tochinai.

14065. OORTWIJN BOTJES, J. Een zwakke stam van het virus van de grofmozaïekziekte. [A weak strain van mild mosaic.] [With Eng. summ.] Tijdschr. Plantenziekten 45(1): 25-29. 1939.—Potatoes of the var. Industrie free from any virus disease are known in the Netherlands as "Dark Industrie." The same var. with light green foliage is known as "Light Industrie." Expts. demonstrated that mild mosaic from the var. Eigenheimer was transmitted much easier to the dark than to the light form; the last being practically immune. This protection indicates that the virus in "Light Industrie" and that of mild mosaic are related strains, the first giving weaker symptoms.—H. L. G. de Bruyn.

14066. OTERO, JOSÉ I., and MELVILLE T. COOK. Third supplement to partial bibliography of virus diseases of plants. Jour. Agric. Univ. Puerto Rico 22(3): 263-409. 1938.—A continuation of previous work published in this Journal. It contains a list of more than 1000 publications.—

M. T. Cook.

14067. PARRIS, G. K. A new disease of papaya in Hawaii. Proc. Amer. Soc. Hort. Sci. 36: 263-265. 3 fig. 1938(1939).—A new disease of Carica papaya in Hawaii, first seen in 1937, causing yellowing, crinkling and slight necrosis of leaves followed by abscission, and hydrotic, darker green than normal, slightly raised, longitudinal streaks on petioles and stems is shown to be due to a virus. Plant mortality has ranged from 6 to 30% on Oahu, on which island the disease is apparently localised. Over 75% transmission has attended mechanical abrasive inoculations, with carborundum powder, from diseased to healthy foliage. The upper 3 of a tree is usually killed by the action of the virus, though more usually the leafless stem persists for some time, with a few small, distorted leaves at the top. New shoots developed from diseased stems usually remain healthy, a point somewhat conflicting with the virus nature of the disease. Fruits on diseased trees are smaller than normal and "bleed" profusely.—G. K. Parris.

14068. ROLAND, G. Onderzoekingen verricht in 1937

over de vergelingsziekte en enkele minerale gebreken bij de biet en de spinazie. [Investigations on the yellow virus disease and on some deficiency diseases of beets and spinach.] [With Fr. summ.] Tijdschr. Plantenziehten 45 (1): 1-22. 1 pl. 1939.—A single Myzus persicae may transmit the yellow virus. The aphids do not lose their ability to

transmit the virus after feeding for 3 days on healthy beets. Macrosiphum solanifolii may also serve as a vector. Infection by contact of roots was not confirmed. Transmission by juice was not obtained. In certain vars. rich in anthocyanin the symptoms consist of reddening instead of yellowing of the leaves. The progeny of the aphids do not transmit the virus. Early sowing diminishes the disease. Leafroll virus of potatoes and yellows virus of beets are not identical though their symptoms are very similar. In spinach, the symptoms of the yellows virus are yellowing, necrosis of interveinal tissues of old leaves, gummy degeneration of the phloem and accumulation of starch. The typical symptoms of the yellows virus disease appear only if the plants have sufficient water and receive a complete manure. The symptoms on beet foliage due to deficiency of K, N, P, are descr. and compared to those of yellowing. Lack of P favors the development of aphids. Recommended as control measures are early sowing of beets and late sowing of spinach, removal of winter spinach before April, the selection of healthy plants for seed-bearers and control of aphids in seed fields.—H. L. G. de Bruyn.

14069. SILBERSCHMIDT, K., e J. C. CARVALHO. Observações citologicas sobre o mosaico do fumo. [Cytological observations on tobacco mosaic.] [With Ger. abst. p.270.] Arq. Inst. Biol. [São Paulo] 9: 261-271. 1 fig. 1938.—There is a close relation between the distinctness of the symptoms and the frequency of cell inclusions in Solanum aculeatissimum, S. atropurpureum-S. sisymbrifolium and S. variabile infected with the mosaic disease of tobacco. Mosaic-diseased leaves of S. atropurpureum and S. aculeatissimum which are characterized by a distinct mottling and malformation contain great quantities of x-bodies and of striated bodies. On leaves of S. sisymbrifolium the mosaic-disease of tobacco produces only a faint mottling. In the cells of trichomes of such leaves the authors found no x-bodies and only a few striated bodies. No cell inclusions were observed in the leaf cells of *S. variabile*, a species which shows a complete masking of disease symptoms. The striated bodies were studied in living hair cells of leaves, the x-bodies in material fixed and stained according to Goldstein's method. K. Silberschmidt.

NON-PARASITIC DISEASES

14070. BRUYN, H. L. G. de. Mangaangebrek, oorzaak van de kwade harten van erwten. [Mn-deficiency as the cause of marsh spot of pea seeds.] [With Eng. summ.] Tijdschr. Plantenziekten 45(3): 106-120. 2 pl. 1939.—Peas were cultivated in water- and sand-cultures with slightly acid and slightly basic solns. to which increasing quantities of MnSO. were added. The greater part of each cotyledon of the mother-seed was removed and the last came from an affected lot, having thus a low content of Mn. It was shown that Mn-deficiency is the cause of Marsh Spot; in the more basic solns. more MnSO₄ was required to obtain healthy peas, but in acid solns. also, if MnSO₄ was either absent or present only in very small quantities, the pea seeds became affected. Marsh Spot occurred equally in solns of pH 6.3 and pH 8.15. The seed in late developed pods of an

6.3 and pH 8.15. The seed in late developed pods of an individual plant showed more severe symptoms than seed from the first formed pods.—H. L. G. de Bruyn.

14071. CAMP, A. F., and B. R. FUDGE. Some symptoms of citrus malnutrition in Florida. Bull. Florida Agric. Exp. Sta. 335, 1-56, 1939.—This bulletin includes descriptions of the leaf, twig and fruit symptoms characteristic of citrus in the field in Florida, including Cu, Zn, Mn, Fe, B, Mg and N deficiencies. Illustrations in both color and black and white are included. The symptoms involved in deficiencies of 2 or more simultaneously are discussed. A discussion of the various factors involved in the occurrence of the deficiencies in Florida is included with particular reference to soil conditions and fertilizer practices. The basic procedures used in correcting the deficiencies are listed. The bulletin is intended to aid growers in diagnosing grove conditions, and to be used as a reference work in connection with the publication of subsequent papers.—Authors.

14072. HESTER, JACKSON B. A trace element deficiency on the tomato. *Proc. Amer. Soc. Hort. Sci.* 36: 744-746. I fig. 1938(1939).—Nutritional studies on 3 virgin soils in N. J. showed a malnutrition on the older leaves of the tomato that was corrected by traces of B in fertilization. The symptoms were described as they were different from the symptoms reported in the literature.—J. B. Hester.

14073. NEILSON JONES, W. On the occurrence of needle fusion in pines in the south of England. Empire Forest. Jour. 17(2): 244-246. 1938.—This condition is found in stands of P. radiata and P. contorta near Wareham, Dorset. No recovery has been observed in the field and affected trees usually die. Recovery occurs after repotting in good soil. The disease is apparently nutritional, the result of a fall in absorptive efficiency due to sudden failure of the mycorrhizal system; this leads to deficiency in some minor element (?boron) the amount of which in the soil is near the critical value required by the plant.—W. Neilson Jones.

14074. PARK, MALCOLM, and M. FERNANDO. The

14074. PARK, MALCOLM, and M. FERNANDO. The nature of chilli leaf-curl. Trop. Agric. [Ceylon] 91(5): 263-265. 1 pl. 1938.—A leaf curl of Capsicum frutescens in the Jaffra Peninsula of Ceylon appears to be caused by or carried by insects, as proven by spraying with nicotine insecticide and subsequent protection from insects.—W. D.

Pierce.

14075. PAUL, W. R. C., and M. FERNANDO. The effect of manuring on the incidence of chilli leaf-curl. Trop. Agric. [Ceylon] 92(1): 23-27. 1 fig. 1939.—A type of leaf-curl of Capsicum frutescens which is different from that previously described in Ceylon, occurs in the dry zone and is characterized by the adaxial curling of the margins of affected leaves and the buckling of intervenous areas. Affected leaves remain small and the fruits are malformed. Analysis of data in a fertilizer expt. showed that deficiency of the soil in N and in organic matter could be eliminated as possible causes of leaf-curl. Examination of the distribution of affected plants suggested the possibility that insects were responsible, either directly or as vectors of a virus disease.— W. D. Pierce.

14076. SCHREVEN, D. A. van. Over verschijnselen van boriumgebrek bij aardappelknollen zooals deze zich openbaren op het veld. [Symptoms of boron deficiency in potato tubers as manifested in the field.] [With Eng. summ.] Tijdschr. Plantenziekten 44(6): 289-296. 2 pl. 1938.—Symptoms of B deficiency were found in the vars. Industry and Red Star in a field on which beets had been affected with heart rot. Tubers from a plot receiving Chilean nitrate were distinctly less affected than those of a plot receiving Ca(NO₃)₂. In the non-treated portion of the field 63% of the tubers showed necrosis; on the part treated with borax only 16% showed slight symptoms. The most characteristic symptom is brown discoloration of the vascular ring, usually most prominent at the stem end and often starting at the attachment of the stolon. The cortical tissue may also be affected. In severely affected tubers the tissues within the vascular ring often appear glassy.—H. L. G. de Bruyn.

14077. WALKER, J. C. Internal black spot of garden beet. Phytopath. 29(2): 120-128. 4 fig. 1939.—A detailed description, with accompanying illustrations, is given of root and top symptoms as they occurred in Detroit Dark Red variety of garden beets in Wisconsin trials. Numerous attempts to isolate a causal organism failed. In boron-deficiency expts. of 1937, fields in several Wisconsin areas representing differences in elevation, soil type, reaction, and available potash and P were treated with commercial borax. No injury to plants resulted from applications of 10, 20, or 30 lbs. per acre. Data from all trials are tabulated, and show that blackening occurred under all conditions, with no absolute correlation between results in high and low areas nor areas of high or low P content. On several farms reduction of the disease occurred in treated plots as compared with adjacent untreated ones, but on 2 farms (one of acid soil, one alkaline) no benefit occurred. The disease was seen to increase progressively throughout the growing season.—J. C. Walker.

PARASITISM AND RESISTANCE

14078. FISCHER, GEORGE W. Studies of the susceptibility of forage grasses to cereal smut fungi. II. A preliminary report on Ustilago hordei and U. nigra. Phytopath. 29(6): 490-494. 1939.—Three collections of a covered smut on Agropyron cristatum and Elymus glaucus, morphologically indistinguishable from U. hordei were inoculated

into Beldi Giant and Trebi Barley. One authentic collection of *U. hordei* on Beldi Giant Barley was also used. Monosporidial cultures of these collections were crossed in all possible combinations and inoculated into the 2 barley vars. Both vars. were smutted, (1) by each of the 3 grass collections of *U. hordei*; (2) by the collection from Beldi Giant; and (3) by all the crosses between the collections. The collections of covered smut on *Agropyron* and *Elymus* are, therefore, *U. hordei*. 25 spp. of grasses in the tribe Hordeae were inoculated with the same 4 collections of *U. hordei*, with 10-50% infection resulting on *A. caninum*, *E. canadensis*, *E. glaucus jepsoni*, *E. sibiricus*, Hordeum nodosum, and Sianion jubatum. Inoculations of the same grasses with *U. nigra* gave 30-50% smut on *E. canadensis*, *H. nodosum*, and *S. jubatum*.—*G. W. Fischer*.

14079. HESSE, CLARON O. Variation in resistance to brown rot in apricot varieties and seedling progenies. Proc.

brown rot in apricot varieties and seedling progenies. Proc. Amer. Soc. Hort. Sci. 36: 266-268. 1 fig. 1938(1939).—Under climatic conditions especially favorable for brown rot [Sclerotinia laxa] infection the relative resistance of several apricot vars. to natural infection was studied in 1935 and 1938, and of over 1200 apricot seedlings of 12 seedling progenies in 1938. The relative degree of infection by brown rot was estimated on a 0-5 basis, 0 indicating freedom from infection, and 5 severe infection resulting in materially weakened trees. Because the vars. were sprayed and only small tree numbers were available for study only a relative ranking of several more important commercial vars. was given. The unsprayed seedling trees showed considerable variation in resistance to brown rot, seedling progeny averages varying from $1.42 \pm .084$ to $3.68 \pm .067$. St. Ambroise, Moorpark and Tilton progenies averaged more resistant than combinations of other vars. Tilton progenies were resistant only in crosses involving other parents which gave resistant progenies. The data, though not conclusive, indicate the relative value of certain apricot vars. as parents in obtaining new apricot vars. more resistant to brown rot.—C.O.Hesse.

14080. HYNES, H. J. Studies on Helminthosporium rootrot of wheat and other cereals. 3. Factors influencing infection. 4. The control problem. N. S. Wales Dept. Agric. Sci. Bull. 61. 1-66. 15 fig. 1938.—When Helminthosporium sativum was the parasite wheat seedling injury was greater when the water content of the soil was 60-65% than when it was 30% of the water-holding capacity and when the field seedings were made on the normal sowing date in the autumn rather than later when temps. average lower. Low soil moisture content during early growth followed by high soil moisture in the later stages of development favored root-rot in adult wheat plants. There was less root-rot in the adult stage of wheat when sown early than when sown late in the autumn. The adult stage was reached during warmer weather in the late sowings than was the case with the early sowings. Thus high temps, in the autumn and in the spring seem to favor early and late infection respectively. Under field conditions the author concludes that more injury was usually evident when soil moisture was high or low. An intermediate condition, about 10-11% wh.c., seemed to reduce root-rot. Cutting back wheat when 12 inches high to simulate feeding by sheep increased injury from root-rot. Combinations of different parasites used to infect wheat induced more damage than when used separately. Also the environmental effects were shifted depending on the combinations. Helminthosporium m., H. sativum, Ophiobolus graminis, Penicillium sp., and Fusarium sp. were used. Root-rot control is difficult. Crop rotation, summer fallow, adequate organic-matter content of soil, well consolidated land and moderation in sheep-grazing the growing wheat tend to reduce root-rot.—H. H. McKinney.

wheat tend to reduce root-rot.—H. H. McKinney.

14081. KENDRICK, JAMES B., and FRED N. BRIGGS.
Pythium root rot of milo and the development of resistant varieties. California Agric. Exp. Sta. Bull. 629. 1-18. 7 fig. 1939.—Pythium root rot of milo is caused by a soil-borne fungus, Pythium arrhenomanes spread by overflow water, irrigation, etc. The fungus destroys the roots, and thus kills plants in the seedling stage or stunts and weakens plant growth. A greenhouse test showed Double Dwarf Darlo, a new var. developed by the Agronomy Division, to be highly resistant to the disease; this var. compares favorably

with Double Dwarf Yellow milo in yield, but is about 2 weeks later in some sections and is less tolerant of alkali and heat. Severely diseased commercial fields of Double Dwarf Yellow and Dwarf White milos showed a few apparently normal plants. Single-plant selections of these made in severely diseased commercial plantings proved highly resistant when grown in infested soil. The selections of Double Dwarf Yellow mile showed no marked differences in their growth habit or vield. Considerable pure-line resistant seed of this var. is available and is being distributed through the Calapproved plan as Double Dwarf Milo 38. The resistant strains of Dwarf White and Heileman will be

increased for distribution under the same plan.—M. Rubo.

14082. KRIJTHE, N., en J. C. WENT. Inoculaties van iepenbastaarden verticht in 1938. [Inoculations of elm hybrids conducted during 1938.] Tijdschr. Plantenziekten 45(2): 71-74. 1939.—Inoculations with Ceratostomella ulmi were made on 464 plants resulting from 88 crosses made during 1937. The progeny of crosses with Ulmus glabra or U. laevis as the mother plant were very susceptible. Among the hybrids in general certain special types were distinguished, and correlations were found between these types and susceptibility to the elm disease. The seedlings of the type resembling U, glab ra were the most susceptible. Those of the type of U, folia cea having broad leaves were more susceptible than the small-leaved forms, in keeping with the general rule that strong-growing elms are the most severely diseased. Confirmation of this rule was also observed in trees grown on plots of different kinds of soil, the number of diseased trees being Largest on the best soil.-H. L. G. de Bruyn.

14083. McFADDEN, E. S. Brown necrosis, a discoloration associated with rust infection in certain rust-resistant wheats. Jour. Agno. Res. 58(11): 805-819. 4 fig. 1939.—
Artificial inoculation with stem rust or exposure to natural infection before the host tissues had been long exposed to sunlight resulted in the development of pigmented areas ("brown necrosis") in certain wheats such as Hope and H-44 which have a specific type of mature-plant resistance to stem rust. Rust-susceptible vars, and vars, having other types of resistance remained free from brown necrosis. Brown necrosis has often been confused with several wheat diseases, usually the bacterial black chaff disease caused by Bacterium translucens var. undulosum. Two types of mature-plant resistance to stem rust, "photologic" and "morphologic," segregated from an H-44 × Marquis wheat cross. Brown necrosis occurred only in plants having the photologic type of resistance. Inoculation expts. with F2 plants from a cross between H-44 and Marquis wheats demonstrated that the brown necrosis reaction can be used as an indicator for identifying plants that carry the factor for photologic resistance prior to the blooming period, and can therefore be utilized to simplify breeding for rust resistance by the backers s method.—E.S. McFadden.

14084. REDDICK, DONALD. Scab immunity. Amer. Potato Jour. 16(3): 71-76. 1939.—Solanum commersonii, S. chacoense, S. caldasia var. glabrescens, S. jamesii, and an unnamed var. were grown in soil heavily infested with Actinomyces scabies; for 2 successive years they gave an immune reaction. All of the spp. mentioned have some very objectionable characters including late maturity, long stolons and in those of the group commersonia a bitter flavor. Interspecific hybrids have been obtained. The usefulness of the species in a program of breeding for the development of scab-resistant sorts of commercial value remains to be de-

termined.—D. Reddick.

14085. SMITH, CLAYTON O., and L. C. COCHRAN. Rust on the California native Pruni. Phytopath. 29(7): 645-646. I fig. 1939.—Rust of Prunus (Tranzschelia pruni-spinosae) developed on the following native California Prunus spp. in a mixed planting under natural conditions: P. andersonii, P. subcordata, P. fasciculata, and P. fremontii. P. emarginata was artificially infected. P. demissa and P. emarginata were not infected .- Authors.

14086. SOLACOLU, TH., M. CONSTANTINESCO, et D. CONSTANTINESCO. Action de la colchicine sur les tumeurs veretales provoques par le Bacillus tumefaciens. Compt. Rend. Soc. Biol. 130(11): 1148-1150. 1939.—Colchicine mixed at a rate of 0.50-0.75% with lanoline, when applied in continuous layers, inhibited the growth of crown gall on the stems of Pelargonium zonale and the hypocotyl axis of Ricinus communis.—H. Simons.

14087. VERONA, ONORATO. Sul meccanismo di azione dei sali di potassio nella resistenza allo sviluppo delle malattie batteriche delle piante. [Influence of potassium malattic patterione delie plante. [Influence of potassium salts on resistance to bacterial diseases in plants.] Nuovo Gior. Bot. Ital. 45(1): CLXXIV-CLXXVIII. 2 fig. 1938 (1939).—Seedlings of Ricinus communis grown in a standard soil to which was applied every second day small quantities of solns, containing different salts (K, Ca, Na, Mg), were infected with Bacterium tumefaciens, and the development of tumors noted. Nitrates favored tumor growth; sulphates. chlorides, and powdered sulphur retarded it. The influence of K or other salts in decreasing bacterial disease in plants as judged from the writer's expts. seems due rather to the anions than to the cations.—F. Ramaley.

14088. VISSER, W. C. Opmerkingen betreffende een geval van halmdooder-voetziekte bij tarwe op een stikstofhoeveelheden-proefveld op zandgrond. [Occurrence of wheat takeall disease in a quantitative nitrogen experiment on sandy soil.] Tijdschr. Plantenziekten 44(6): 280-288. 1938.—The variation in Ophiobolus graminis infection of wheat grown on plots receiving different quantities of N was investigated. No direct correlation with the fertilizer used was observed the influence of soil texture being paramount, and in this field the texture itself was variable. Next to the effect of texture, the influence of differences in exposure to sun and rain, due partly to unequal development of the crop as result of the nitrogen treatment and partly due to the position of the plots was observed. In all parts of the field where the ratio of the volumes of soil, water, and air was less than 50:20:30 Ophiobolus infection was prominent. H. L. G. de Bruyn.

14089. WENT, J. C. Verslag van de onderzoekingen over de iepenziekte, verricht op het phytopathologisch labora-torium "Willie Commelin Scholten" te Baarn, gedurende 1938. Investigations of the elm disease at the phytopathological laboratory "Willie Commelin Scholten" at Baarn in 1938.] Tijdschr. Plantenziekten 45(2): 52-62. 1939.—Inoculation exps. with Ceratostomella ulmi on various Ulmus seedlings were continued. Of those treated during the last 2 yrs., 83.6% were diseased, the remainder showed some degree of resistance. From trees selected during former years 2 specimens of *U. foliacea* again remained healthy but their growth was not very vigorous. Inoculations on the selected tree "Christine Buisman" resulted in 3% of diseased trees, from which *C. ulmi* was reisolated. Subsequently the lesions were overgrown and no further symptoms could be detected. Of 67 inoculations on the same tree by means of bark beetles positive results were obtained in only one case. Treatment of the diseased trees with CuSO₄ did not kill the fungus.—H. L. G. de Bruyn.

DISEASE CONTROL

14090. BAKER, R. E. D. The control of scab and certain other diseases and pests of grapefruit by fungicides and insecticides. Trop. Agric. [Trinidad] 16(2): 31-34. 1939.—A discussion of the sprays to be used against Sphaceloma

faucetti, Phomopsis citri, and the mite Phyllocopterus oleivorus, as well as the scale insects.—W. D. Pierce. 14091. BALLOU, F. H. Earlier tests and continued use of mild sprays in Ohio. Rept. Iowa State Hort. Soc. 72: 117-122. 1937.—The author reviews the experiences of orchardists and station workers in apple spraying in Ohio, especially for the past 15 yr. It is stated that successful use of unusually mild or dilute sprays depends very largely on timeliness and thoroughness of application. The more timeliness and thoroughness of application. The more recently tested and extensively used liquid lime sulfur-wettable sulfur combinations are considered to be sprays of but moderate cost, yet the results of their use in the form of clean, glossy, highly colored, sound apples—even in years of severe scab—clearly reveal what safe, potent, relatively inexpensive sprays are capable of accomplishing when timely and thorough applications are made.—Courtesy Exp. Sta.

14092. GOURLEY, J. H. Recent advances in apple spray programs. Rept. Iowa State Hort. Soc. 72: 112-117. 1938.— This review discusses earlier concepts in spraying, comparison of sprays for control of apple scab, and suggested spray formulas for Ohio conditions. In general, for post-bloom one-half of the strength used in the pre-bloom sprays is recommended. If scab is controlled early, for the rest of the season it is just as important to look to the preservation of the finish of the fruit. With vars. very susceptible to russeting, the author used only lime and Pb arsenate in the post-bloom sprays.—Courtesy Exp. Sta. Rec. 14093. HORSFALL, JAMES G., G. E. R. HERVEY, and

14093. HORSFALL, JAMES G., G. E. R. HERVEY, and R. F. SUIT. Dwarfing of cucurbits sprayed with bordeaux mixture. Jour. Agric. Res. 58(12): 911-927. 2 fig. 1939.—Bordeaux mixture induces the following 6 distinct symptoms of injury on cucurbits: Dwarfing, leaf deformation, yellowing of leaf margins followed by necrosis, scorching of leaf lamina, accelerated transpiration and defloration. The dwarfing and leaf-deformation aspects of the problem were studied in greenhouse expts. during the winter seasons of 1936 to 1938 inclusive, and some of the conclusions were checked during summer seasons of the same years. The lime portion of bordeaux mixture dwarfed cucurbits and deformed the leaves; the copper portion did not appear to be involved unless the Cu was solubilized by high pH. An increase in spray load (amt. of material per 50 gallons of spray i.e., 2-2-50, 4-4-50, 6-6-50 etc.) increased the injury. The most significant factor in dwarfing and leaf deformation appears to be the pH. If the pH value of the spray mixture was shifted very far either way from neutral, dwarfing was increased whether Cu was present in the spray mixture or not. It is suggested that the dwarfing may be due to (1) physiological drought in the tissues induced by the effect of bordeaux transpiration, (2) to action of Ca ions in hardening the tissues, or (3) to reduced photosynthesis, or to a combination of these causes. Some of the so-called inert diluents caused injury when applied to cucurbits. The safest diluents that were tried were diatomaceous earth, gypsum, tale and wheat flour. Ca arsenate appeared to be a satisfactory insecticide from the standpoint of safety.—R. F. Suit.

14094. MacDANIELS, L. H., and E. M. HILDEBRAND. The effect of copper compounds applied to spur units during bloom upon the set of apple fruits. Proc. Amer. Soc. Hort. Sci. 36: 230-233. 1938(1939).—Copper-lime dust (20-80) and Bordeaux mixture (2-6-100) were applied to apple blossoms immediately after pollination on spur units enclosed in glassine bags. Two flowers were left on each spur. In one set of spurs both flowers on the spur were treated alike. In the other series both flowers were pollinated but only one was treated with spray or dust. Although the set was reduced by the treatment, it was not inhibited in all cases. On the spurs with only one flower treated the set of the treated flowers was reduced but the number of spurs holding one fruit was increased as compared with the spurs which had 2 flowers pollinated but not treated with bactericide. This increase is interpreted as resulting from reduced competition on spurs with one flower treated as compared with spurs on which 2 flowers were treated alike. In general the data support the statement that these materials applied during bloom will not prevent a commercial set of fruit.—L. H. MacDaniels

set of fruit.—L. H. MacDaniels.

14095. McKAY, M. B., and T. P. DYKSTRA. Potato diseases in Oregon and their control. Oregon Agric. Exp. Sta. Circ. 127. 1-84. 61 fig. 1938.—General control measures, crop rotation, "seed" selection and disinfection, spraying, and storage conditions are discussed. Approx. 3 of the text follows with respect to specific diseases, and includes those due to parasites, viruses, and climatic or environmental conditions. A key to potato diseases is provided.—Courtesy

Exp. Sta. Rec.
14096. MARCHAL, E., et R. MAYNÉ. Etat actuel de l'étude de la maladie de l'orme. Bull. Soc. Centr. Forest. Belgique 46(5/6): 193-202. 1939.—A résumé of present knowledge of the Dutch elm disease (Ceratostomella ulmi) and its control. It is recommended that particular attention be given in Belgium to selecting and propagating resistant individual elm trees.—W. N. Sparhawk.

individual elm trees.—W. N. Sparhawk.

14097. MELHUS, I. E., and G. C. KENT. Apple scab and apple blight. Rept. Iowa State Hort. Soc. 72: 106-112. 1 fig. 1937.—Following a survey in 5 Iowa counties indicating the

need for a reinvestigation of scab control, orchard expts. were conducted (1933-37) and showed that in Iowa the scab spores are often discharged before the cluster-bud spray. It is thus advantageous to know when the spores are matured and ready to be discharged in order that the spray may be timed to precede the first ascospore discharge, rather than to depend wholly on the developmental stage of the flowers. In some seasons a prepink spray should be applied. No lime-sulfur substitutes were found. Spraying of infected leaves on the ground in spring to kill the fungus can be considered only as a supplementary measure. The bacterial blight has been known in the State since records have been available, and has been troublesome at various times, as noted in 1858 and later. Several of the serious outbreaks are briefly referred to, and recent developments in its control are outlined. The treatment of cankers (especially when young) has proved effective when thoroughly done. A ZnCl₂ mixture (9 lb. ZnCl₂, 1 qt. water, and 3 oz. HCl) seems to have been most successful, and bordeaux mixture (1-3-50 or 1-5-50) applied twice, when 25 and 80%, respectively, of the flowers are in bloom, had a beneficial effect in localities where blight was serious. Data in regard to transmission by bees from the hive appeared to indicate little danger in using bee colonies which were in an infected orchard the previous year if the bees are moved before the trees become active in the spring—Courtesu Erra Sta Rec

active in the spring.—Courtesy Exp. Sta. Rec.

14098. PAPE, HEINRICH. Die Praxis der Bekämpfung von Krankheiten und Schädlingen der Zierpflanzen. 475p. 8 col. pl., 336 fig. P. Parey: Berlin, 1939. Pr. 19M.—The 3d revised edition of this handbook contains about 50 more pages and 33 more figures than the 2d edition of 1936. As in former editions, the plan is followed of presenting a general discussion of the extent of plant disease and pest losses, the agents of and factors in parasitism and disease, and the means and materials used in their control. Special sections are devoted to (1) plant parasites and animal pests which are injurious in garden and greenhouse plant culture generally, and (2) to the diseases and pests of individual plant species. Hosts are listed alphabetically; diseases (including virus, physiological, and of unknown cause) and pests (insects, nematodes, mollusks) are grouped according to the plant part attacked. Even relatively minor diseases and pests are briefly described and considerable information of special mycological and entomological interest is presented. The illustrations, most of which are technically excellent and well reproduced, are very helpful in identifying the diseases and injuries which are described. The coverage of special literature is in general thorough and up-to-date.—F. Weiss.

14099. PAUL, W. R. C., and M. FERNANDO. Some

14099. PAUL, W. R. C., and M. FERNANDO. Some studies on tobacco diseases in Ceylon. 5. The use of fungicides in the control of damping-off of tobacco seedlings. *Trop. Agric.* [Ceylon] 91(6): 338-344. 5 fig. 1938.—In a controlled expt. with 3 proprietary fungicides, a colloidal copper compound gave almost complete control of damping-off.—W. D. Pierce.

14100. PELTIER, GEORGE L., F. R. SCHROEDER, and ERNEST WRIGHT. Distribution and prevalence of ozonium root rot in the shelterbelt planting area of Oklahoma. Phytopath. 29(6): 485-490. 3 fig. 1939.—Much of the success of tree planting in the Southwest depends upon the location of Phymatotrichum (Ozonium) omnivorum root-rot infested lands prior to planting operations. The present paper describes the methods of survey employed within the shelterbelt planting area of Oklahoma. The western limit of root-rot infestation extended somewhat beyond the 99° meridian. The northern limit was located just south of the Wichita Mts.; the eastern limit extended across the Red River into Texas. An apparent relationship exists between Ozonium-infested areas and certain watersheds and drainage basins of the larger rivers. On the basis of the information obtained, the U. S. Forest Service can now safely make shelterbelt plantings either by avoiding Ozonium-infested lands or by using resistant tree species on infested soil.—E. Wright.

ECOLOGY

Editors

W. C. ALLEE, General Animal Ecology G. D. FULLER, General Plant Ecology CHANCEY JUDAY, Hydrobiology (Oceanography, Limnology)

FREDERICK A. DAVIDSON, Ecology of Wildlife Management-Aquatic W. L. McATEE, Ecology of Wildlife Management-Terrestrial

ROBERT G. STONE, Bioclimatology, Biometeorology

(See also in this issue Entries: [GENERAL AND ANIMAL ECOLOGY]: Ecology of prehistoric animals, 14342; Population density, 14556; Ribernation, 14621; Bumble-bees as pollenizers, 15562; Soil nematode—soil fungus relationship, 15874; Effect of flooding on soil insects, 15900; Range of Japanese beetle, 15901; Clover midge, 15903; Meadow and pasture insects, 15904; Wood wasps and their parasites, 15926; Parasites and predators-Simulium, 15930; Cave faunas, 15942; Hydractinia on snail shells, 15982; Adaptations in eyes of whirligig beetle, 16033; Panama Canal as a passageway for fishes, 16051; Bird migration, 16082. [PLANT ECOLOGY]: Ecological significance of polyploidy, 14345; Mycorrhizal fungi, 15438, 15674; Bryophytes of Tennessee, 15479; Erosion of cultivated fields, Kansas, 15550; Soil moisture availability, 15552; Water economy of forests on sandy soil, 15626; Forests of coastal areas, of Malaya, 15636; Reforestation in Italy, 15638; Effects of forest fires, 15643; Forest of Finland, 15650; Forest succession in Switzerland, 15664; Germination of spruce and pine seed, 15667; Structure of virgin forests, 15683; Water relations of broad-leaved evergreens in winter, 15746)

GENERAL

14380. BOUYOUCOS, G. J., and A. H. MICK. A method for obtaining a continuous measurement of soil moisture under field conditions. Science 89(2307): 252. 1939.—The moisture content of a standardized block of CaSO4 (gypsum) buried in the soil varies directly with that of the soil and may be measured by determining the electrical conductivity of the block by means of electrodes and a form of the Wheatstone bridge. A high degree of accuracy is reported.-

Courtesy Exp. Sta. Rec. 14381. WELLS, B. W., and I. V. SHUNK. The important rôle of salt spray in coastal ecology. Jour. Elisha Mitchell Sci. Soc. 54(2): 185-186. 1938.

BIOCLIMATOLOGY, BIOMETEOROLOGY

(For further information on the effect of climatic and weather factors on organisms or processes see also, in this issue, Entries 14380, soil moisture measurement; 14395, marine temps. and plankton in East Iceland current; 14417, temp. of impounded waters, affecting fish population; 14437, incubation of game-bird eggs; 14513, blood formation in rabbits; 15101, water consumption by range cattle, Arizona; 15113, sexual development of fowls; 15114, high temp. affecting blood velopment of rows; 15114, high temp, aneeting blood Ca of hens; 15310, epidemiology of influenza; 15442, light wave-lengths and exposures affecting growth of mold; 15550, rainfall affecting soil organic matter, Kansas; 15586, humidity affecting vitality of seeds; 15599, effects of heating orange groves; 15600, frost protection by flowers, citrus orchards; 15626, water residebility and regeneration of pine forests. 15667 availability and regeneration of pine forests; 15667, germination of spruce and pine seed; 15676, rainfall affecting forest increment; 15703, humidity-control chamber for auxin tests; 15741, temp. affecting photoperiodism, spinach; 15754, effects of ultra-violet on plants; 15771, freezing injury to wheat; 15772, seasonal sugar variations affalfa: 15800 and divisor for more started. sugar variations, alfalfa; 15800, conditions for mass multiplication of phytopathogenic fungus; 15891, temp. affecting tobacco mildew; 15901, future distr. of Japanese beetle in N. America; 15903, clover midge abundance; 15906, winter temps. affecting May beetle larvae; 15924, temp. and humidity affecting zoophilism of Anopheles; 15928, cold- and dryness survival of grasshopper eggs and parasites; 15936, cellar wintering of honeybees; 15959, seasonal variation in reproduction of intestinal parasite of rat; 16093, weather affecting bird flights; 16094, seasonal habits of tree sparrow, Japan. See also in issue 7(September), Entries 10743, Japan. See also in issue 7 (September), Entries 10/43, diabetes mellitus; 10772, animals and environment; 10789, maqui vegetation; 10782, range of plant communities; 10808, spawning of oysters; 10820, winter behavior of deer, Wisconsin; 10832, marine animals; 10833, skin permeability (man); 10895, respiratory power of asphyctic blood; 10903, metabolism (rat) in reduced barometric pressure; 10914, blood hemoglobin; 10933, blood composition in magnetains; 10939, lympho-10933, blood composition in mountains; 10939, lymphocytes in fever; 10940, blood changes in mountain climbing; 10990, ultra-violet affecting Ca and P metabolism; 11042, 11044, pulmonary ventilation in atmosphere containing rare gases; 11045, respiration, book; 11083, color changes in animals; 11085, regulation of basal metab-olism; 11120, rhythms in animals; 11121, heat affecting heart action (frog); 11129, stimulation of retina; 11126, brightness threshold of dark-adapted eye; 11128, light responses, earthworm; 11134, illumination affecting metabolism during reading; 11179, pressor effect of inhaled CO₂; 11197, thermal reflex vasodilatation; 11242, salt affecting resistance to histamine; 11262, effect of SO₂ (animals); 11290, ultraviolet affecting cholesterol content of tissues; 11305, hypoglycemia in anxiety and degenerative diseases; 11306, multiple sclerosis; 11329, blood coagulation time; 11342, insolation in epidemic dropsy, India; 11357, 11358, 11364, 11367, 11370, 11371, 11372, industrial diseases and atmospheric poisons; 11471, energy metabolism in goat; 11489, animal production in Turkey; 11492, desiccation effects, meat; 11504, illumination of poultry houses, effects; 11509, diurnal sequence in egg formation, poultry; 11541, allergy; 11547, epidemiology of common cold; 11681, temp.-sensitivity of polyarthritis organisms (of rat); 11682, tuberculosis mortality, Mass. and Mich.; 11692, air-borne contagion; 11698, cholera in Russia, 1830-1872; 11700, venereal disease; 11701, U-v. air sanitation; 11711, climate and spread of disease; 11715, tuberculosis in tropics and subtropics; 11938, potato yields, Ohio; 11942, pastures; 11964, black soil pigment; 11992, shape of beet root; 11995, transplanting fruit trees; 12012, climatic requirements of native and exotic trees, Austria; 12014, of exotic trees, Netherlands; 12055, cultivation of Ephedra; 12062, water balance of tropical orchids; 12080, 12081, photoperiodism; 12087, photosynthesis and light quality and intensity; 12088, gaseous exchange, lichens; 12090, rel. humidity and stomatal transpiration; 12092, water relations of grasses; 12097, seasonal effects on respiration of tomatoes in greenhouse; 12205, hurricane (Sept., 1938) effects on shade trees, New England; 12210, Malaria in Bahrein Is.; 12270, in Panama; 12261, climate affecting incidence of liver fluke (Fasciola); 12314, mollusks in ice, North Sea; 12396, temp. and butterfly emergence; 12408, caddis fly)

14385. EREDIA, F. La meteorologia e l'aerologia degli oceani. 1. l'Oceano Atlantico Sud. 2. L'Oceano Atlantico Nord. Rivista Marittima Suppl. 176p. 1932. 300p. 1935. Publ. by the Ministero della Marino, Rome, Italy.—The author has put into a readable well-organized form an extensive summary of the literature on the meteorology of the Atlantic, especially those elements of interest to aviation. The point of view is climatological, however, and little discussion is devoted to individual storm analysis and forecasting. Nevertheless, the meteorologist, climatologist, or ecologist, could hardly obtain a better background of what to expect as the normal conditions than by a perusal

of this work. As much space is devoted to the coasts as to the water areas proper, perhaps necessarily since data of some kinds are so meagre from the oceans. As a bibliographic survey these books are very helpful, too, though some important source materials are occasionally overlooked.—

R. G. Stone. 14386. B

HACKBART, W. Der Einfluss kurzfristig wirkender Temperaturen auf die Entwicklung und Fortpflanzung von Schadinsekten. Zeitschr. Morph. u. Ökol. Tiere 35(3): 469-534. 11 fig. 1939.—The Brazilian bean beetle (Zabrotes subfasciatus) is stenothermous, developing normally from 22-31°C, optimum at 27°C; above or below these temps. mortality is high, chiefly because of failure of young imagoes to escape from the beans. At 35°, only I generation can be reared on this account, and because of generation can be reared on this account, and because of failure of \$\text{9}\$ to lay eggs. When eggs were placed at 19°C, only a few \$\text{9}\$ emerged and almost no \$\text{d}\$. The mortality of young larvae placed at 40°C was 80% in 18 hrs., 100% in 72 hrs.; at 10°C, 80-90% died in 6 days. Most pupae survive 40, 10 and 0°C for 4 days or more but longer exposures result in high mortality. The young imagoes are more susceptible to the extremes, giving 97% mortality in 4 days at 40°, 12 days at 0°. Exposures of 1st instar larvae to 40° for periods varying from 24-144 hrs., retard the entire develop, the more so the longer the exposure, resulting in later and later hatching of pupae. Similar short ing in later and later hatching of pupae. Similar short exposures to 10° yield similar results. Exposure of pupae to 40° or 10° for varying short periods also delays the emergence of the imagoes. Exposure of embryos or larvae to temp, extremes does not affect the fertility (number of eggs laid) of Ω coming from such treated stages, but Ω from treated pupae show a diminished fertility. Exposure of Ω to Ω for 8-120 hrs. results in diminishing fertility; treatment of Ω alone has little effect. Treatment of Ω on either the 1st or 2d day of their life with Ω for 24 hrs. does not affect the number of eggs laid but does diminish their viability. If the treatment is extended to 48 hrs., those exposed during the 1st 2 days of life lay few eggs of those exposed during the 1st 2 days of life lay few eggs of poor hatchability but thereafter can lay good eggs, whereas when exposed during the 3d-4th days of life, the eggs laid thereafter do not hatch. Fertilized \$\text{2}\$ do not survive as long as virgins; the life of \$\delta \text{3}\$ is about equally long whether they are sexually active or not. Exposure to 40°C shortens the life of \$\delta \text{3}\$, according to the length of exposure but may lengthen the life of \$\text{2}\$ through reducing the number of eggs laid. Exposure to 0°C may lengthen the life of some \$\delta \text{3}\$, those thereby rendered sexually inactive; in \$\text{2}\$ it lengthens the preovipository period but does not affect period of egg-laying or length of postovipository life. Temp. conditions thus affect the 2 sexes differently. The effect of a conditions thus affect the 2 sexes differently. The effect of a harmful factor may be graphically expressed by plotting the % of eggs laid (max. being taken as 100%) on the

the % of eggs laid (max, being taken as 100%) on the ordinate and the survivors in % on the abscissa. The angle of the curve with the abscissa ("Keilwinkel") permits comparisons between different investigations.—L. H. Hyman.

14387. JUSATZ-GOTHA, H. J. Über das rythmische Auftreten von Grippeepidemien und die Möglichkeit einer epidemiologischen Prognose. Zeitschr. Hyg. u. Infektionskrankh. 121(3): 185-207. 1938.—A critical review of the claims for and against a periodic recurrence of influenza epidemios leads the author to conclude that there is as yet epidemics leads the author to conclude that there is as yet no trustworthy evidence that such recurrences are correlated in any way with the allegedly rhythmical terrestrial or extraterrestrial phenomena such as periods of maximum or minimum precipitation, temps., wind velocities, solar activity or sun spots. Forecasts must be limited to recurrences within an epidemic. A reliable basis for more distant forecasts can come only when exact statistical data on morbidity and mortality have been accumulated for long

periods of time.—H. J. Sears.

14388. LASSETTER, R. The value of tree-ring analysis in engineering. Tree-Ring Bull. 5(2): 13-15. 1938.—The author reports briefly on several studies in northeastern Tennessee as showing the value of the tree-ring technic as an aid in hydrological problems, viz., adaptation of the technic to tree growth in the area, determination of the degree of relationship between tree growth and hydrological phenomena, when a suitable relation exists to compute the approx. precipitation and run-off from tree growth values as far back as the growth curve extends, and if

possible to learn something of climatic trends in the area. The relationships derived from tree growth appear to be satisfactory enough to be of value in approximating past hydrological conditions.—Courtesy Exp. Sta. Rec. 14389. MÜLLER, KARL M. Untersuchungen über die

Ursachen des Blitzeinschlages in der freien Natur, insbesondere über die Blitzfrage im Walde. Centralbl. ges. Forstwesen 64(11): 287-300; (12): 316-335. 5 fig. 1938.—This paper discusses the problem of the relation between This paper discusses the problem of the relation between conditions in the outer layers of the earth's crust and the incidence of lightning strikes. The works of various investigators are reviewed, including von Pohl, Lehmann, Wehrhahn, and Bogojavlensky. Their results seem to confirm the thesis that there is a relation between lightning strikes and subterranean radiation. Lehmann found that the poles of a high tension power line that were struck most frequently were those standing over or close to inter-sections (at different levels) of subterranean streams of water (as revealed by divining rods and by electrometers).
The electric conductivity of the air over such streams was greater than elsewhere. Wehrhahn's studies showed that, contrary to popular belief, any sp. of tree may be struck by lightning, although some, such as oak and poplar, appear by lighthing, attnowed some, such as oak and popular, appear to be more susceptible than others and beech, birch, and alder less susceptible. The author's own investigation showed that trees hit by lightning generally stand over intersections of subterranean veins of water. Certain spp. (oaks and willows) thrive only under the influence of earth rays from such water veins; others (beech, conifers) cannot grow in such spots. Location of the veins may shift as a result of earthquakes, which explains the presence of conifers in places where they are struck by lightning. Lightning fires in the forests of N. W. No. America are closely correlated with shifts in subterranean water, and consequently with the incidence of earth rays, which both cause trees to be attacked by insects and fungi and draw lightning. Certain birds instinctively avoid nesting in places exposed to earth rays and hence to lightning; swallows and storks are mentioned.—W. N. Sparhawk.

14390. NORBURN, MARTHA ELIZABETH. Climate of

the Carolina highlands. Jour. Elisha Mitchell Sci. Soc. 54

(2): 189. 1938.
14391. VILLARET, BERNARD. Climatologie médicale des Établissements français d'Océanie. 48p. Paris, 1938.-After a collection of climatological information drawn from good authority, the author launches an instructive chapter concerning the influence of the climate on the demography, hygiene and living conditions in the French settlements of the South Sea Islands. The effect of the humidity, of the air, and of the sun, of the rainfall, of the temp, etc., on the propagation of certain diseases, notably elephantiasis and leprosy, affords an interest of the first order. A discussion of the influence of the climate on Europeans terminates the volume.-R. G. Stone.

ANIMAL

14392. CASPERS, H. Histologische Untersuchungen über die Symbiose zwischen Aktinien und Korallenfischen. Zool. Anz. 126(9/10): 245-253. 6 fig. 1939.—Why fish symbionts of actinians are not stung by the anemone has never been explained. In a study of the association of coral fishes (Amphiprion percula) and tropical anemones (Stoichactis), the fish skin and the anemone tentacles were examined histologically. The fish skin failed to show any characteristics which might protect it against nematocysts. The tentacles of the anemone do not, however, contain any nematocysts proper, being provided only with spirocysts. The function of spirocysts is not understood, since they have never been seen to discharge, but it is certain that they have no toxic action; hence *Stoichactis* is incapable of injuring its commensal fish. It probably catches food by the adhesive action of the numerous gland cells in the tentacles.—L. H. Hyman.

PLANT

14393. GLOVER, J. The root-system of Agave sisalana in certain East African soils. *Empire Jour. Exp. Agric.* 7(25): 11-20. 12 fig. 1939.—The "water method" described by Nutman (Empire J. Expt. Agric., 1933), was used for determining the root-systems. The root-system of an aver-

age 5-yr.-old plant has a radius of at least 10 ft. and a depth of 40 in. The physical nature of the soil and especially its water-retaining capacity can profoundly modify the root-distribution, but within wide limits the pH of the soil apparently, does not. Production of the flowering shoot is followed by progressive degeneration of the feeder-roots. Weed roots occupy the same layers of soil as those of the sisal, and the resulting competition is especially severe in areas liable to a deficiency of soil moisture.—

J. Glover.

14394. STEUSLOFF, U. Zusammenhänge zwischen Boden, Chemismus des Wassers und Phanerogamenflora in fliessenden Gewässern der Lüneburger Heide um Celle und (Nebst Untersuchungen über die Perlmuschel in diesen Gewassern.) Arch. Hydrobiol. 35(1): 70-106. 1 pl., 4 fig. 1939.—Analysis of the phanerogam flora of certain slowly flowing streams in the Lüneburg Heath (Hanover) shows the existence of several associations, the occurrence of which is correlated with temp. and the dissolved materials in the water (particularly nitrate, phosphate, chloride) and hardness. Such plants as Scirpus fluitans, Juncus supinus, Potamogeton polygonifolius, Montia rivularis, Prujescens, Callitriche hamulata, and Myriophyllum alterniforum are practically confined to the cooler, soft-water, low-nutrient upper reaches, while a large group, including P. natans, P. crispus, P. perfoliatus, P. lucens, Callitriche stagnalis, Sagittaria sagittifolia, Myriophyllum spicatum, Butomus umbellatus, Acorus calamus, and Scirpus lacustris occurs only in the broad, warm lower reaches, rich in dissolved nutrients. Another group of plants, indifferent as to choice of habitat within the region, was also noted. The temp. requirements of the several important indicator species are discussed, and the several associations distinguished are referred to the standard associations of the German plant-sociologists. Notes on the biology of the pearl mussel, Margaritana margaritifera, are appended. This mussel is found in two of the streams investigated, in the reaches characterized by Myriophyllum alterniflorum. Data on dimensions and weight of the shell are given; the very slow growth is attributed to Ca deficiency in the waters favored by the species. The zoogeography of the mussel in Europe is discussed; it is confined to Ca-poor regions within the borders of the maximum (Riss) glaciation. The occurrence in the Lüneburg Heath, outside the border of the last (Würm) glaciation, is not regarded as a case of interglacial relict distribution but is more probably to be attributed to migration from Scandivania during Ancylus time.-E. S. Deevey.

OCEANOGRAPHY

(See also in this issue Entry 16015)

14395. MESCHKAT, A. Untersuchung tiber das Herbstplankton im Bereich des "Ostislandstromes." Internat. Rev. ges. Hydrobiol. u. Hydrogr. 38(3/4): 285-352. 30 fig. 1939.—During Oct. and Nov., 1935, 4 profiles were made in the region between eastern Iceland and Jan Mayen Land by the "Meteor"; oceanographic details have not yet been published, but preliminary results were available to the author, who deals primarily with the surface plankton. A tongue of cold water of low salinity, a branch of the east Greenland current, extends through the region from the northwest to meet the warm, saline waters of the Gulf Stream, one branch of which encircles Iceland in a clockwise direction to form the Irminger current. The isohaline of 34.8% is taken as demarcating the "subarctic" from the "Atlantic" water mass; in addition to the main tongue of subarctic water, two small tongues extend into the area in the vicinity of Jan Mayen Land. The relation of plankton to hydrography is examined by the method of cartographic correlation. Figures for total Protista are compared with these for phosphate, and a rough negative correlation is found, the Atlantic water being richer in plankton and poorer in phosphate than the subarctic. The hydrographic differentiation of plankton, however, is not striking until the several components are analyzed separately. When the difference: log Protophyta—log Protozoa, is plotted, the subarctic water is found to be characterized by consistent negative values, the Atlantic by positive, except for a relatively small area occupied by the maximum

density of Metazoa, in which an anomalous excess of Protophyta is attributed to removal of the smaller animals by the larger. When the distribution of individual plankters is considered, a number of forms are observed to characterize, with varying degrees of completeness, the water masses distinguished. Especially characteristic in the intensity of its distribution in the subarctic water is the Tintinnid Ptychocylis obtusa, while the few occurrences of the diatom genus Achnanthes are likewise closely restricted to the colder water mass. Of the forms found to be essentially diagnostic of Atlantic water, the plotted distributions of the Peridinians Ceratium longipes, C. horridum, and C. tripos, the diatom Nitschia seriata, and the radiolarian Protocystis tridens, are particularly striking. Two examples of forms restricted to coastal waters are given in the diatoms (Sceletonema costatum and the chain-forming Thalassiosira species). As an example of biocoenotic influences on the distribution of plankters the occurrences of the Tintinnids *Ptychocylis obtusa* and *P. urnula* are analyzed. Although *P. obtusa* characterizes subarctic water, *P. urnula* Atlantic, both species occur together in the zone of mixture, in densities not obviously correlated with hydrography. When it is realized that the volumes of the two species are approx. in the ratio *urnula:obtusa* = 125:64, and the differences between the logarithms of the individual numbers are plotted, the line for the difference log 64 minus log 125, marking the line of equal mass per unit volume of water, separates the two species, and is found to coincide with the isotherm 6.5° C. A number of forms are found whose distribution is not explicable on hydrographic or other grounds, notably among the Metazoa. In conclusion, it is pointed out that many anomalies in distribution of plankters are intelligible only on the basis of mixture of the water masses, and that with the availability of estimates of abundance throughout a given region and the exercise of careful judgment, certain forms can be used as biological indicators of such hydrographic admixture. A synthetic, summary map of the region under consideration is presented, based on the distributions analyzed, which indicates considerable lateral mixing, and is said fully to substantiate the hitherto unpublished conclusions of the other members of the oceanographic expedition.—E. S. Deevey.

14396. NIELSEN, E. STEEMAN. Über die vertikale Verbreitung der Phytoplanktonten im Meere. Internat. Rev. ges. Hydrobiol. u. Hydrogr. 38(5/6): 421-440. 1 fig. 1939.—
In discussing the vertical distribution of marine phytoplankton the author examines the question of the existence of "light" and "shade" species, relying on his investigation of the plankton of the "Dana" collections. In nearly all northern oceans the hydrography is such that differentiation of species of different light requirements is impossible; but in the tropics, where thermoelines lie deeper and light penetration is greater, such differentiation can occur, and is particularly striking in the case of the species of Ceratium. Series of plankton hauls made with the closing net in the Indian and eastern Asiatic oceans permit division of the Ceratium species into oligophotic, mesophotic, and euphotic forms. The mesophotic forms are those found deeper in plankton-poor (highly transparent) stations, shallower at plankton-rich or detritus-rich stations. A reply is made to the objections raised by Schubert against the author's published views on this subject. No evidence of vertical migration of Ceratium was found by the "Dana."—E. S.

Deevey.

14397. WHEDON, W. F. A three year survey of the phytoplankton in the region of San Francisco, California. Internat. Rev. ges. Hydrobiol. u. Hydrogr. 38(5/6): 459-476. 2 fig. 1939.—As part of an investigation of poisoning by the mussel Mytilus californianus, surface plankton samples were collected from a pier in San Francisco at frequent intervals. No evidence of correlation between temp. variations and numbers of either dinoflagellates or diatoms could be found, but the number of species recorded was observed to parallel the seasonal change of water temp. The major pulse of diatoms occurred during the 2d quarter of each year, while the dinoflagellate maximum was recorded during the 3d quarter, except in 1935. Diatoms greatly outnumbered dinoflagellates in nearly all samples.—E. S. Deevey.

LIMNOLOGY

(See also in this issue Entries 14394, 14411, 14416, 14422, 14553, 15333)

14398. IVLEV, V. S. Transformation of energy by aquatic animals. Coefficient of energy consumption by Tubifex (Oligochaeta). Internat. Rev. ges. Hydrobiol. u. Hydrogr. 38(5/6): 449-458. 1 fig. 1939.—The "coefficient of energy consumption" is defined as the ratio of the quantity of energy accumulated in the body of an organism to the total quantity of energy consumed during the same time. In order to evaluate this coefficient for Tubifex, a series of expts, was performed in which the increase in calorific value of animal material was determined from the increase in weight; the animals were fed on organic silt containing about 1% platinum black per unit of dry weight, the excrements were collected, and the calorific capacity of the silt passed through the intestine was detd. from the Pt content. On an average 50.37% of the energy in the silt was absorbed. The mean value of the coefficient of energy consumption was 31.59%. This value is compared with other determinations for fish (17-35%) and Aspergillus (20-58%, depending on the medium). The coefficient is shown to differ with differing environmental conditions and with the age of the organism, while the taxonomic position of the organism is believed to have little effect.—E. S. Deevey.

14399. LACKEY, JAMES B. Aquatic life in waters polluted by acid mine waste. Publ. Health Repts. 54(18): 740-746. 4 fig. 1939.—Acid coal mine streams and strip pits were biologically surveyed in early spring and late summer. While supporting a dense population, waters in the acid range pH 1.8 to pH 3.9 showed only 99 spp., 18 of which were common. Typha latifolia was the dominant higher plant, the remaining 17 spp. being Algae, Protozoa and Trochelminthes. Euglena mutabilis occurred in 88.57% of all samples.—J. B. Lackey.

NÖTHLICH, K. Der jahreszeitliche Gang der physikalisch-chemischen Eigenschaften der Havel und Spree unterhalb von Berlin in den Jahren 1934 und 1935. Internat. Rev. ges. Hydrobiol. u. Hydrogr. 38(3/4): 212-230. 7 fig. 1939.—Frequent, often daily observations at several stations distributed throughout a 17 km. reach of the Spree below Berlin from May 1934 to July 1935 permitted analysis of variations in temp., dissolved O₂, O₂-consumption, free CO₂, bicarbonate, carbonate, pH, chloride, and phosphate. In order to evaluate the influence of municipal pollution, data for 3 divisions of the reach are presented separately. Cultural influences are particularly apparent in the figures for dissolved O₂ and O₂-consumed. Variations in free CO₂ are closely related to those for O2; variations in bicarbonate, carbonate, chloride, and phosphate are primarily due to fluctuations of water-level. The effect of the latter factor on pH is masked by the buffering action of the dissolved materials. Data are appended for the Wannsee, a backwater of the Spree, which indicate a considerable thermal and O. stratification, particularly in summer.—E. S. Deevey.

14401. STEINWENDER, J. Das Plankton in den Teichen der Striegauer Steinbrüche. Internat. Rev. ges. Hydrobiol. u. Hydrogr. 38(5/6): 401-420. 2 fig. 1939.—Investigation of the plankton of 5 ponds in abandoned granite quarries in Silesia indicates a general poverty of biota, attributable to extreme deficiency of dissolved materials. Littoral vegetation is almost or entirely absent on the steep walls; transparency is in general high. The quarries examined can be divided into two groups, the unmodified or oligotrophic group, and the eutrophic group, characterized by contamina-tion by poultry excrement. That such waters acquire plankton very rapidly is indicated by observations in one quarry, abandoned in 1933, in which representatives of all major groups found in other quarries (Copepods, Cladocera, Rotifers, Peridinians, Chlorophyceae, Cyanophyceae, Diatoms) were present at the end of 67 days.—E. S. Deevey.

14402. VOLTERRA d'ANCONA, L. Un nuovo periodo di ricerche sulle Dafnie di Nemi (1930-1935). [A new period of research on the Daphnia of Lake Nemi.] Internat. Rev. ges. Hydrobiol. u. Hydrogr. 37(6): 571-603. 1 pl. 1938.—
The lake contained originally a race of D. longispina; D. cucullata was established in the lake by Woltereck in 1914 from ephippia obtained from Frederiksborg in Denmark.

The cyclomorphosis of the two forms has been studied in earlier years. In 1928 began a lowering of the level of the lake for archaeological researches; this was continued until 1932 when the lake lay 21.4 m. below the original water level. Subsequently the lake has filled up slowly; in 1935 it was 15.7 m. below the original level. In 1930 plankton became abnormally abundant, both species of Daphnia were present in increased numbers, grew rapidly and exhibited much sexual reproduction. D. cucullata remained unchanged, but in Oct. 1931 a well marked round-headed form of D. longispina, which had shown no morphological change since the earliest known samples (1897), appeared. Various abnormal forms interpreted as due to depression, as the result of overcrowding, were also observed. In 1932 D. cucullata disappeared, and D. longispina became rare, finally disappearing after the time of minimum level. No Daphnia could be obtained in 1933. D. longispina reappeared in April 1934. Both species were common in July of that year, represented by conspicuously smaller forms than previously present. After a short reappearance, D. longispina disappeared and apart from a few doubtful forms, only D. cucullata occurred in April. By the end of 1935 the whole population consisted of undoubted specimens of a small form of the latter species. The possibility of hybriditions of the latter species. zation producing the small number of doubtful forms is discussed; if such hybridization occurred it has had no

general effect on the present population.—G. E. Hutchinson. 14403. WERNER, B. Über ein neues, automatisch schlies-sendes Bodennetz. Internat. Rev. ges. Hydrobiol. u. Hydrogr.

38(3/4): 368-371. 3 fig. 1939.

14404. YOSHIMURA, S. Stratification of dissolved oxygen in a lake during the summer stagnation period. Internat. Rev. ges. Hydrobiol. u. Hydrogr. 38(5/6): 441-448. 3 fig. 1939.—Preliminary analysis of the oxygen data for 208 Japanese lakes indicates that metalimnetic maxima are much more frequent in Japan than in most other lake districts investigated. Assuming the compensation level to correspond to 1.2 times the mean summer transparency as measured with a Secchi disc, as appears justifiable, the frequency of metalimnetic maxima can be attributed to the fact that epilimnia are thinner in Japan than in the Baltic region, for example. Due to the relatively slight windinduced turbulence, compensation levels tend to lie below the zone of turbulent mixing, and the oxygen maxima produced are not subsequently destroyed. Shallow Japanese lakes tend to lack the metalimnetic oxygen maximum, not because they are less transparent or more thoroughly disturbed by winds, but due to the gradual diffusion upward throughout the summer of a microzone nearly devoid of oxygen.-E. S. Deevey.

WILDLIFE MANAGEMENT-AQUATIC

(See also in the section "Pisces"; and Entries 14397, 15086, 15322, 15333, 15361, 15375, 15385, 15391, 15686, 15948, 16019, 16051)

14405. BANGHAM, R. V., and N. L. BENNINGTON. Movement of fish in streams. Trans. Amer. Fish. Soc. 68: 256-262. 1938(1939).—This report is a continuation of a study conducted during the spring and summer of 1936 and includes, in addition to the area covered in the earlier investigation, two other portions of stream each 1 mile in length. As in 1936 the larger fish were tagged, measured and then released. From June 15 to Sept. 17, 1937, 11.7% of 487 tagged fish were recaptured. No fish tagged the previous year were caught. Native stream fish seem to be acclimated to their habitat and do not move as far as introduced fish. No marked fish were taken except near the station where the tagging was done. The data for distribution of species show considerable variation in the species composition of the fish population of a given area from week to week.— Authors.

14406. BIERRY, R., et B. GOUZON. Les huitres de consommation. A travers les âges, Biologie, Élevage et production, Valeur alimentaire, Salubrité. In: Actualités Scientifiques et Industrielles. 136p. 8 fig. J. B. Baillière et Fils: Paris, 1939. Pr. 25fr.—This booklet is designed for lovers of the savory oyster who desire knowledge of its curious life and its nutritive and therapeutic values. It is a comprehensive summary of the history of ostreiculture and

culinary use of oysters from prehistoric and classic times to the present. The anatomy of the adult and larval stages, development, breeding seasons, relations of seasonal and environmental conditions to reproduction, enemies and diseases of the two main European species, Ostrea edulis and Gryphea angulata, are reviewed. Cultural methods, including collection of spat, growing, fattening, greening, and conditioning for shipment as practiced in the oyster parks of France are outlined. The stabulation or autopurification of contaminated oysters as developed under sanitary direction is described. A map showing the prevalence of typhoid fever in districts of oyster production is given. Biochemical analyses of oysters are reported showing the content of iodine and various rare minerals and of vitamins A and D,

and the low caloric value.—C. A. Kofoid.

14407. DAVIS, H. S. Objectives in trout stream management. Trans. Amer. Fish. Soc. 68: 76-81. 1938(1939). The primary purpose of trout stream management must be to provide sport and recreation for as many persons as possible. In heavily fished streams the object should be to provide numbers of medium sized trout rather than a few large fish. Artificial stocking with small trout has been a failure in many instances; stocking with legal fish shortly before or during the open season has been more successful.

Failures in artificial stocking are due largely to planting fish in unsuitable waters.—H. S. Davis.

14408. ESCHMEYER, R. WILLIAM. Summary of a four year creel census on Fife Lake, Michigan. Trans. Amer. Fish. Soc. 68: 354-358. 1938(1939).—A creel census was taken on Fife Lake, a 739-acre Michigan lake, for 4 successive fishing seasons, 1934 to 1937 inclusive, shows constant decline in the catch of some species and a corresponding increase in the catch of others. The total take remained allering to the catch of relatively constant from year to year; an increase of 92% in fishing effort resulted in an increase in the take of only 16%. Increase in fishing was apparently more closely associated with a decrease in the catch per fishing hour than with an increase in the total catch. Some correlation was

found between the percentage of larger pisciverous fish and the size of pan fish in the catch.—R. W. Eschmeyer.

14409. FREY, DAVID G., HUBERT PEDRACINE, and LAWRENCE VIKE. Results of a summer creel census of lakes Waubesa and Kegonsa, Wisconsin. Jour. Wildlife Management 3(3): 243-254. 1939.—Both lakes are strongly eutrophic. Water flows from Waubesa into Kegonsa through 4 miles of river. Information was obtained by having the boat livery operators and fishermen fill out census cards, and from the data obtained, careful estimates were made of and from the data obtained, careful estimates were made of the total fishing in each lake. Waubesa of 2,034 acres yielded 75,000 fishes from May 15 to October 15, 1938; Kegonsa of 3,145 acres yielded 45,000 fishes. 80% of the Waubesa catch was black crappies; 50% of the Kegonsa catch was white bass. Waubesa yielded 1.86 fish and Kegonsa 1.24 fish per fashing hour. Wasked differences were observed in eath fishing hour. Marked differences were observed in catch composition compared with fish censuses of previous years, in which blue gills were dominant. There was no correlation between numbers of fish stocked and numbers caught. More than 2 million pounds of carp were removed from Waubesa

during 1938.—D. G. Frey.

14410. HAZZARD, ALBERT S., and DAVID S. SHETTER. Results from experimental plantings of legalsized brook trout (Salvelinus fontinalis) and rainbow trout (Salmo irideus). Trans. Amer. Fish. Soc. 68: 196-208. 5 fig. 1938(1939).—Intensive creel census during the 1937 trout season in conjunction with monthly releases of 3,000 legalsized trout, over ½ of which were marked, furnished data for the evaluation of such plantings in the Pine River, Michigan. Nearly 8,500 hrs. of fishing yielded 3,171 brook trout and 3,333 rainbow trout, an average catch of 0.77 fish per hr. 46% of the brook trout and 21% of the rainbow trout originated from the hatchery plantings. Incomplete records of the marked fish showed recovery of 19.8% of 7,513 brook trout planted and 17.5% of 4,007 rainbow trout released. The plantings influenced the catch for only 2-3 weeks. Every planting during the open season caused a rise in the catch of wild fish of the same species. Planting large numbers of legal fish increases the catch temporarily and artificially, but such plantings may deplete a stream of wild adults, which would affect natural reproduction adversely in succeeding years.—D. S. Shetter.

14411. HUBBS, CARL L., and R. W. ESCHMEYER. The improvement of lakes for fishing. A method of fish management. Bull. Inst. Fish. Res. [Michigan] 2. 1-223. Illus. 1938.—This is a practical study of ways and means of conserving, increasing, and exercising more of a scientific control of the production of game and food fishes in lakes. It is largely directed toward the increase of vegetation, rock and brush shelters, and other forms of shelters favor-ing the multiplication of water insects and minnows and attractive environments for spawning and protection of fry. Erosion, pollution, wave action, oxygen deficiency, winterkill, algal nuisances, control of migrations of fishes, elimination of competitors, predators, and excess of coarse fish, and depletion are among the topics discussed. Little attention is given to manuring and other means of increasing true plankton production, the main basis of productivity of lakes. This is a pioneer study of basic problems in the recovery and preservation of important features in our natural resources of both food and sport. It has an extensive annotated bibliography, full index, and abundant illustrations of many practical details.—C. A. Kofoid.

14412. KING, WILLIS. A program for the management of fish resources in Great Smoky Mountains National Park. Trans. Amer. Fish. Soc. 68: 86-95, 1938 (1939).—The streams in Great Smoky Mountains National Park are one of its most attractive natural features. Fish resources are managed in an effort to provide the best fishing compatible with the preservation of native stream fauna. Smallmouth bass occupy the lower portions of the streams along the borders of the park, usually below 1,600 feet in elevation. Brook trout occupy the headwaters, occurring as low as 3,000 ft. in a few instances. The rainbow trout, an introduced species, occupies the band between the first 2 spp. mentioned, occupies the band between the first 2 spp. mentioned, slightly overlapping their distribution when no falls or cascades intervene. Native species (smallmouth bass and brook trout) are stocked in waters which they are able to occupy, and rainbow are used to fill in the gaps. 300,000 fingerling trout, including both rainbow and brook trout, and averaging 4 to 6 inches in length, are planted annually during Sept. and Oct. The fry are obtained from the U. S. Bureau of Fisheries Hatchery near Smokemont, N. Carolina, and are reared in 35 standard-type concrete rearing pools. and are reared in 35 standard-type concrete rearing pools, part of which are operated in connection with the hatchery and part by the National Park Service at the Chimney's Camp Ground on the Tennessee side of the Park. The fishing season extends from May 16 to Aug. 31. Fishing is permitted between 5 A. M. and 6:30 P. M. Central Standard Time, and with artificial lures bearing only one hook. A limit of 10 fish of one or all spp. may be taken, of rainbow 8 in. in length or over, of brook trout and rock bass 6 in. or over, of smallmouth bass 10 in. or over. The season on the last 2 spp. opens June 16 and ends Aug. 31. The protection and preservation of native stream fauna is considered paramount in the management program.

14413. LAGLER, KARL F. The control of fish predators at hatcheries and rearing stations. Jour. Wildlife Management 3(3): 169-179. 1939.—In 1937, 15;223 reptiles, birds, and mammals were killed at 228 fish hatcheries in 38 states according to figures based on returns from a nation-wide poll. Of the several control methods reported, screening and wiring of ponds and raceways and shooting and trapping of predators afforded the greatest protection. Wider use of controls that do not involve the wholesale destruction of actual or supposed predators is recommended.-K. F. Lagler.

14414. LEONARD, JUSTIN W. Feeding habits of the Montana grayling (Thymallus montanus Milner) in Ford Lake, Michigan. Trans. Amer. Fish. Soc. 68: 188-195. 1938 (1939).—A sample of 50 grayling averaging 89 mm. in standard length was collected on May 18, 1937. Stomach examinations showed that larvae and pupae of the Chironomidae made up 65.4% of the diet; predacious insects nymphs of Enallagma carunculatum and E. hageni together with adult dytiscid beetles (Bidessus sp.), accounted for 28.1%. 32 grayling averaging 162.5 mm. in standard length were collected from Oct. 18 to 20, 1937. In their diet Odonata nymphs accounted for 25.3% while immature chironomids dropped to 8.5%. The unusual occurrence of large amounts of predactous insects raises anew the question of selectivity vs. availability in fish feeding habits.—J. W. Leomard

14415. LUCAS, CLARENCE R. Game fish management. Trans. Amer. Fish. Soc. 68: 67-74. 1938(1939).—Present freshwater game fish work in the U. S. includes all the elements necessary to management. These elements are not well coordinated, however. This lack of coordination renders the work partially ineffective. The several objectives of today's operations are giving haphazard results which we should recognize as subject to betterment. Scientific surveys, censuses, and studies, hatchery work, regulations, stream improvement, and other fish conservation activities should be developed in a coordinated program based upon a single purpose, the increase of satisfactory fishing. To accomplish this balancing of activities, the use of coordinators, or fish managers, is recommended.—C. R.

14416. MOTTLEY, C. McC., H. J. RAYNER, and J. H. RAINWATER. The determination of the food grade of streams. Trans. Amer. Fish. Soc. 68: 336-343. 1938(1939).— The volume and number of organisms per unit area of bottom is widely used in determining the relative richness or food grade of streams. The food grade is an important factor in the calculations used to determine the number of fish to plant per mile of stream. Although the food grade is so important and inaccurate determinations may lead to wasteful practices, no one seems to have investigated the fundamental problems involved. The paper outlines these problems and presents data to show that there is a considerable variation in the food grade as determined by a number of workers studying one stream at the same time and that high water may completely alter the picture.— C. M. Mottley.

14417. SENNING, WILLIAM C. The chemistry of impounded waters as a factor in game fish production. Trans. Amer. Fish. Soc. 68: 303-308. 1938(1939).—Chemical conditions that directly affect fish life were investigated in a large number of small, new and old artificial lakes in New York State. Examples are cited which indicate that chemical conditions tend, at first, to be unsuitable for game fish everywhere in the lake, and no stocking should be done. As the lakes increase in age, the surface layer of water improves sufficiently to support fish, but the deep, cold waters rarely improve enough to provide a suitable environment for cold-water species. The rate and degree of recovery depend on the volume and temp. of the water passing through the lake, on the depth of the water, and on the type of vegetation established.—W. C. Senning.

14418. SHETTER, DAVID S., and ALBERT S. HAZ-

14418. SHETTER, DAVID S., and ALBERT S. HAZZARD. Species composition by age groups and stability of fish populations in sections of three Michigan trout streams during the summer of 1937. Trans. Amer. Fish. Soc. 68: 281-302. 2 fig. 1938(1939).—Intensive studies of the fish populations in 3 sections of the South Branch of the Pine River, 2 sections of the Little Manistee River, and 3 sections of the North Branch of the Boardman River were carried out monthly from June to Sept. 1937. Identical sections in each stream were blocked and seined once monthly. The captured fish were enumerated by species, weighed, measured and fin-clipped and released alive, except in one section of each stream. Scale samples were taken from all trout above age-group O. The efficiency of the blocking- and seining method of stream census was indicated to be between 89 and 100%. The data collected demonstrated that fish population calculations based on samples from 1 or 2 limited stream areas are inaccurate. Distribution of the trout among age groups O to III are presented.—D. S. Shetter.

Distribution of the trout among age groups O to III are presented.—D. S. Shetter.

14419. SPOOR, WILLIAM A., and CLARENCE L. SCHLOEMER. Diurnal activity of the common sucker, Catostomus commersonnii (Lacépède), and the rock bass, Ambloplites rupestris (Rafinesque), in Muskellunge Lake. Trans. Amer. Fish. Soc. 68: 211-220. 2 fig. 1938(1939).—Gill nets were examined at 2- to 4-hr. intervals throughout ten 24-hr. periods. The rate at which suckers were captured at depths around 6 m. was highest during the periods 3-5 a.m. and 7-9 p.m. and lowest during the periods 8 a.m. to 4 p.m. and 10 p.m. to 2 a.m. The rate of capture was high at midday at depths around 8 m. The suckers appear to move inshore in the evening and offshore in the morning.

Apparently the hourly fluctuations in the catch were caused by fluctuations in abundance in the vicinity of the nets which resulted from the inshore and offshore movements. The rock bass were captured in far greater numbers at night than in the daytime. The rate of capture was highest between 7 and 9 p.m., but remained high throughout the night. The rate increased slightly between 3 and 4 a.m. Apparently increased visibility was the chief cause of the decrease in the rate of capture during the day, but there is evidence that rock bass undergo periodic changes in activity. The results offer very little evidence of daily inshore and offshore movements —W. A. Snoor.

decrease in the rate of capture during the day, but there is evidence that rock bass undergo periodic changes in activity. The results offer very little evidence of daily inshore and offshore movements.—W. A. Spoor.

14420. STOUDT, J. H. A study of the migration of the wall-eyed pike (Stizostedion vitreum) in waters of the Chippewa National Forest, Minnesota. Trans. Amer. Fish. Soc. 68: 163-169. 1938(1939).—Of 2637 wall-eyed pike tagged in April 1937, 13.1% were recovered during that year. All pike were tagged with consecutively numbered jaw tags. Wall-eyed pike were mostly finished spawning by June 1. A short time after spawning most of the wall-eyed pike had left their spawning areas and distributed themselves over their summer range extensively. A complete check-up at State spawning nets in 1938 yielded only 13.1% of the total number tagged and left 74% which were unreported. The assumption that most of the wall-eyed pike tagged in 1937 sought new spawning areas in 1938 or remained in Lake Winnibigoshish to spawn may be correct but further checking and additional tagging studies are necessary.—J. H. Stoudt.

14421. SURBER, EUGENE W. A comparison of four eastern smallmouth bass streams. Trans. Amer. Fish. Soc. 68: 322-333. 1 fig. 1938(1939).—Growth studies of fingerling and larger smallmouth bass *Micropterus dolomieu* showed marked differences in 4 streams in the Potomac River watershed. In streams such as the Shenandoah River with a small bass population, fingerlings grew rapidly, but in the South Branch of the Potomac and Cacapon Rivers where bass are abundant, studies showed slow growth rates both in fingerlings and adults. In a study of the extent of natural propagation, actual counts of the number of bass nests per mile were made in 4 rivers. These counts showed several times the number of nests per mile in the showed several times the number of nests per mile in the streams where fishing was poorest than in streams where fishing was good. A seasonal study of the food of fry and fingerling bass was made from monthly collections of fry and fingerlings made during 1936. The chief items of food in both rivers (South Branch of Potomac and Shenandoah Rivers) were mayfly nymphs (Baetis) and chironomid larvae. Entomostraca (chiefly Cyclops) played a minor rôle as food. In the Shenandoah River, where bass grow rapidly, 9.9% of the fry averaging 10 mm, in length had consumed 9.9% of the fry averaging 10 mm. in length had consumed fish, and fish constituted one of the main items of food in fry and fingerlings of all sizes in this river. Bottom fauna studies in riffles of the 4 rivers showed interesting faunal differences. In the clear streams such insect larvae as Eriocera, Atherix, and Chauliodes and nymphs of Isonychia and Iron were more abundant than in the streams which remain muddy for a considerable time. In the latter streams. Sphaeriidae, Oligochaeta, larvae of *Elophila* and parnid beetles, and nymphs of *Potamanthus* were more abundant. Field studies indicate that probably few streams in the region actually require stocking with bass. Rather, forage fish should be stocked for rapid growing fish seem

to be produced in streams in which the ratio of forage minnows to bass is greatest.—E. W. Surber.

14422. TARZWELL, CLARENCE M. Changing the Clinch River into a trout stream. Trans. Amer. Fish. Soc. 68: 228-233. 1938(1939).—The construction and operation of Norris Dam has changed the portion of the Clinch River, just below the dam, from a warm-water to a cold-water stream. Since many of the warm-water forms were killed rainbow trout were planted in 1936. In 1938 quantitative studies of the bottom organisms which were made to determine if a cold-water fauna was developing, demonstrated that only a small residual population was present and that the bottom fauna was not as yet typical of a trout stream. Trichoptera, Ephemeroptera and Odonata were almost lacking but snails constituted 97.21% of the weight of bottom organisms found. Chironomidae greatly outnumbered all other forms. If a typical trout stream does

not develop planting of such forms is recommended.—C. M.

Tarzwell.

14423. Van OOSTEN, JOHN, and HILARY J. DEASON. The age, growth and feeding habits of the whitefish, Coregonus clupeaformis (Mitchill) of Lake Champlain. Trans. Amer. Fish. Soc. 68: 152-162. 1938(1939).—Data are presented on length frequencies, age composition, growth, coefficient of condition, sex ratio and standard length-total length relationship of 120 whitefish collected in northern Lake Champlain (Missisquoi Bay) in 1930, and of 175 whitefish taken in southern Lake Champlain in 1931. Two distinct populations of whitefish exist in Lake Champlain as shown by differences in spawning grounds, rate of growth, differences in actual lengths and weights of corresponding age groups at the time of capture, and differences in the coefficient of condition and the length-weight relationship. The feeding habits were studied through a qualitative and quantitative analysis of the stomach contents of 141 whitefish from southern Lake Champlain. The food consisted of 92.8% molluscs, 6.4% insect larvae and the remainder of fish eggs, plants and inorganic debris.-Authors.

WILDLIFE MANAGEMENT-TERRESTRIAL

(See also the section "Aves"; and Entries 14317, 14413, 15677, 15969, 15976, 16085)

14424. ALLEN, DURWARD L. Winter habits of Michigan skunks. Jour. Wildlife Management 3(3): 212-228. 4 pl. 1939.—In a southern Michigan study of the eastern skunk (Mephitis m. nigra) 143 individuals were handled by box (Mephitis m. nagra) 145 individuals were namined by boat trapping, steel trapping, and the digging of burrows. In a series of weights 33 && averaged 1,905.1 g. and 30 \cong averaged 1,411.8 g. in late winter. 36 breeding season autopsies indicated that the older \cong \Chi (separated by weight) bred in late Feb. and young \cong about a month later. Of breath face Feb. and young \$\frac{1}{2}\$ about a month face. Of \$26\$ burrows excavated, \$11\$ contained skunks. In each of \$2\$ burrows one \$\delta\$ was found with \$10 \$\frac{1}{2}\$. In no case was more than one \$\delta\$ present with \$\frac{1}{2}\$. Female skunks became inactive in winter earlier than \$\delta\$; hence trapping late in the season takes mostly \$\delta\$\$ and preserves the \$\frac{1}{2}\$ as breeders. Conversely, the digging out of winter dens will take a high preserves of \$\delta\$\$ and \$\delta\$\$ and \$\delta\$\$ is a converse of \$\delta\$\$.

percentage of \$\text{9}\$ and destroy the source of a possible new fur crop.—D. L. Allen.

14426. BOND, RICHARD M. Coyote food habits on the Lava Beds National Monument. Jour. Wildlife Management 3(3): 180-198. Map. 1939.—From 273 droppings and 9 stomachs taken, in all months but February, on the Lava Beds National Monument (adjacent to the Tule Lake Wildfowl Refuge), in Siskiyou and Modoc Counties, California, 706 probably non-carrion food items were identified. Of these 481 (65.18%) were mammals (19 species: Felidae 1, Sciuridae 6, Heteromyidae 2, Cricetidae 5, Erethizontidae 1, Ochotonidae 1, Leporidae 2, Cervidae 1); 26 (3.67%) were birds or bird eggs (7 spp.: Anseriformes 3, Galliformes 2, Passeriformes 2); 8 (1.08%) reptiles; 145 (19.65%) insects; and 46 (6.23%) were vegetable items. Evaluation of effects (as distinguished from activities) of the coyotes is complicated by the occasional or continuous presence of at least 34 other predatory vertebrate spp. in the area.
"....although, to some extent, every vertebrate species on the Monument affects the coyote, and is in turn directly or indirectly affected by it, it appears that the coyote plays rather a minor rôle in the ecology of any of the species it preys upon." No evidence was found indicating necessity of coyote control on the Lava Beds National Monument.—R. M. Bond.

14427. BRADBURY, HAROLD M. Management of apple trees in Massachusetts. Jour. Wildlife Management 3(3): 240-242. 2 pl. 1939.—To improve persistence of fruit, pruning and releasing in varying degrees and giving different exposures were tried. Best results were obtained from a 50% release to the south and west and no pruning of live wood. Grafts of Malus floribunda ("Bob-white") scions gave speedy and excellent returns, one grafted in 1936 bearing 12 apples in 1937. Grubbing around trees to remove competitive ground growth and the use of nitrates produced larger crops. Because of the difficulty and expense due to isolation, these trees are not sprayed and may become hosts to diseases and insects that would invade neighboring orchards. It is recommended that wild apple trees within 500 yards of commercial orchards be removed.—H. M. Bradbury.

14428. BUTLER, OVID (compiled and edited by). American conservation. In picture and in story. 144p. 216 fig. American Forestry Assoc.: Washington, 1935. Pr. \$2.50.—This is a book prepared for popular reading, with the text broken by many sub-headings and illustrations. As stated in the foreword, "Detail has been omitted to bring into helder which the more important cuttings of the mineral properties." into bolder relief the more important outlines of the picture." While very little space is given any one topic treatment is largely devoted to the history of exploitation and conservation of forest resources. The subject matter begins with a brief and simplified account of the origin of the earth and the succession of plant and animal life through geologic time. Next is a description of the New World as it existed at the time of its discovery by the white man. Following are chapters on more or less special phases of conservation problems and accomplishments, in which is included information on National and State Forests and Parks, the Public Domain, Indian Forests, the C. C. C., forest industries, the growth of forest education and research, protection and management of forests, soils, water, and wildlife.—P. L. Errington.

14429. CAHALANE, VICTOR H. The evolution of predator control policy in the National Parks. Jour. Wildlife Management 3(3): 229-237. 1939.—Since establishment of the first national park in 1872, policy as to protection or destruction of predators has fluctuated with official and public changes of opinion. With few exceptions until about 1925, control was pursued as vigorously as financial means permitted. Methods included trapping, hunting with dogs, poisoning and shooting, the latter being used most extensively after 1920 due to its greater selectivity. As thought advanced, the list of proscribed species became smaller and was finally restricted to the cougar, wolf, and coyote. All control finally ceased in 1935. Predators are and will be protected in the same measure as other park animals.-

V. H. Cahalane.

14430. [Conservation of wildlife.] Proc. of Conv. Internat. Assoc. Game, Fish and Conserv. Comm. 29: 1-102. 3 fig. 1935; 30: 1-114. 1 fig. 1936; 31: 1-68. 4 fig. 1937.— 3 fig. 1935; 30: 1-114. 1 fig. 1936; 31: 1-68. 4 fig. 1937.—
The proceedings of the conventions of the International Association of Game, Fish, and Conservation Commissioners held in 1935, 1936, and 1937, are presented. A contribution on Research and Game-Management Units in Land Grant Colleges, by W. C. HENDERSON, is included in the report for 1935 (pp.87-90).—Courtesy Exp. Sta. Rec.

14431. COOK, DAVID B. Thinning for browse. Jour. Wildlife Management 3(3): 201-202. 1 pl. 1939.—Slashings in northern hardwoods are commonly used to produce browse but are costly to maintain. Moderate thinnings will

browse but are costly to maintain. Moderate thinnings will produce continued crops of highly palatable browse without undue disturbance of the forest and at low cost.—D. B.

Cook.

14433. HUME, C. W. The rabbit menace. Empire Jour. Exp. Agric. 7(26): 132-138. 1939.—In Britain rabbits must be controlled by cyanide fumigation and dogging, supplemented by shooting in special situations. The large-scale rabbit-trapping industry must be abolished in the interests of agriculture as well as of humaneness. Ferreting is allowable for supplying local markets of moderate size. In Australia the solution lies in the progressive reclamation of infested land by cyanide fumigation, the reclaimed land being secured by rabbit-proof fencing, by destruction of

harbors and by dogging.—E. H. Tripp.

14435. MORSE, MARIUS. A local study of predation upon hares and grouse during the cyclic decimation. Jour. Wildlife Management 3(3): 203-211. 1939.—From the spring of 1935 to the spring of 1938, population fluctuations of Bonasa umbellus and Lepus americanus were determined for a 2,520-acre forest area in northern Minnesota by periodic censuses using the strip sample method. Greatest population losses occurred in 1935 and 1936, and decimation in the ranks of the grouse apparently preceded that of the hare. Neither was successful in bringing forth any appreciable number of young in 1935. Field observations during the winter of 1935-36 over a period of 4 months indicated that predators, especially raptors, utilized a relatively large percentage of the hares and grouse that were discovered

dead. In the same period, disease appeared to be of only very minor consequence as a factor directly responsible for the extensive hare mortality that was evident.—M. A.

14436. MOSS, A. E. Relation between take of upland game and agricultural land use in Connecticut. Jour. Wildlife Management 3(3): 269-278. 1939.—The Biological Survey research unit at Connecticut State College analyzed the take of game in the State for the years 1927-35 from the returns of hunters' licenses. These data were used in correlating the take of pheasants (Phasianus colchicus) and ruffed grouse (Bonasa u. umbellus) with the open cultivated and forested areas by towns and with the agricultural productivity of the towns rated from information furnished by the Agricultural Economics Department of the State College. The findings indicate that the pheasant population is closely related to soil productivity. The best agricultural lands produce greater returns to the hunter. Density of liberations does not seem to offset lack of soil quality or area in agricultural lands. The ruffed grouse population

shows close relationship to forested areas but does not

fluctuate with soil quality.—A. E. Moss.

14437. ROMANOFF, A. L., G. BUMP, and E. HOLM.

Artificial incubation of some upland game birds' eggs.

New York State Conserv. Dept. and Coll. Agric. Bull. 2.

1-44. 9 fig. 1938.—These studies were conducted to determine the optimum environmental conditions applicable to the practical incubation of pheasant, grouse, and quail eggs and to establish recognizable symptoms by which the cause of unsuccessful hatches might be determined. When the agian incubation temp. of 99.5° F and a relative humidity of from 63 to 68 for pheasants and from 60 to 65 for grouse and quail during the first 20 days of incubation proved most satisfactory. After the 20th day a slight decrease for both in the case of quail eggs proved desirable. Higher incubation temps, were required in the still-air-type than in the agitated-air-type machines. Turning eggs from 3 to 4 times a day and incubating them in a horizontal position are recommended. Other practical suggestions are outlined. -Courtesy Exp. Sta. Rec.

PALEOBOTANY

EDWARD W. BERRY, Editor

(See also in this issue Entry 15944)

15428. FROLLO, M. M. Sur un nouveau genre de Codiacée du Jurassique supérieur des Carpates Orientales. Bull. Soc. Géol. France, 5° Sér. 8(3/4): 269-271. 1 pl., 1 fig. 1938.—CAYEUXIA (Chlorophyceae) from the Upper Jurassic of the eastern Carpathians, related to Mitcheldeania, Orthonella. and Hedströmia. This is the 2d genus of the group to be reported from the Jurassic.—V. W. Tomlin.

15429. JANSSEN, RAYMOND E. Leaves and stems from fossil forests. Illinois State Mus. Pop. Sci. Ser. 1: 1-190. 165 fig. 1939. Springfield, Illinois. \$1.50.—A nontechnical discussion of petrification and fossilization is followed by descriptions, accompanied by figures, of fossil leaves and stems from the coal measures of Illinois. The figures are mostly from photographs of types from the Langford Collection, now in the State Museum, that came largely from the deposits in Will County, Illinois. The fossils are discussed under their various families in a scientific but non-technical manner. The history of the development of paleobotany in America is sketched briefly.—G. D. Fuller.

15430. RADFORTH, NORMAN W. Further contributions to our knowledge of the fossil Schizaeaceae; genus Senftenbergia. Trans. Roy. Soc. Edinburgh 59(3): 745-761. 1 pl. 1939.—With the aid of the transfer and maceration methods, the fructifications of two Carboniferous fern-like plants, Dactylotheca sturi and Senftenbergia pennaeformis, have been analyzed. Sporangia of D. sturi are stalked elliptic structures with an ill-defined dehiscence line and an apical annulus composed of thick-walled cells elongated in the direction parallel to the major axis of the sporangium. Sporangia of S. pennaeformis are similar in type but differ in detail of structure. Spores in their various developmental stages were isolated from both plants. Mature spores of D. sturi bear rounded tubercles; those of S. pennaeformis bear angular ones. D. sturi, having annulate sporangia, becomes a member of Senftenbergia. A comparison of this plant with S. pennaeformis and Senftenbergia plumosa indicates a phyletic series in which the fructifications of D. sturi have the most primitive type of structure and those of S. pennaeformis the most advanced, the latter resembling more closely the structure of fructifications of Aneimia and certain other living schizaeaceous ferns.-N. W. Radforth.

15431. REED, FREDDA D. Structure of some Carboniferous seeds from American coal fields. Bot. Gaz. 100(4): 769-787. 27 fig. 1939.—Specimens of 2 seed genera, Conostoma oblongum and Pachytesta gigantea, showing structure were found in coal balls. The source of the coal balls was from coal no. 5 which is in the Alleghany group of the Upper Pennsylvanian. In both genera the integuments were remarkably well preserved, and in Conostoma the nucellus was intact with numerous pollen grains in the pollen chamber. In neither genus was there any tissue preserved within the megaspore membrane. Illustrations from these two genera and from Lagenostoma ovoides, Cardiocarpon, and Trigonocarpon hookeri are used to demonstrate similarity in development of Paleozoic seeds with those of modern gymnosperms, and to show variation in ontogeny at the time of petrifaction.—F. D. Reed.

15432. TCHIRKOVA, H. TH., et M. D. ZALESSKY. Sur deux nouveaux végétaux permiens. Bull. Soc. Géol. France, 5° Sér. 8(3/4): 207-210. 2 fig. 1938.—Callipteris karskiana, based on a fragment of the apical part of a frond bearing partially-preserved primary leaves of different dimensions and on impressions of isolated portions of primary leaves; and Chiropteris incisa, based on some impressions of a single incomplete leaf and of a small fragment of another leaf; both from the Permian of Siberia.—V. W. Tomlin.

ALGAE

(See also in this issue Entries 15428, 15705, 15781)

15433. COKER, W. C., and LELAND SHANOR. A remarkable saprophytic fungoid alga. Jour. Elisha Mitchell Sci. Soc. 55(1): 152-165. 2 pl. 1939.—SAPROCHAETE saccharophila, fam. SAPROCHAETACEAE (Ulotrichales, near Chaetophoraceae), a plant having the form of a higher green alga and the nutrition of a saprophytic fungus, is reported from 2 stations in northern Chatham County, North Carolina, growing in small spring runs receiving seepage from burning sawdust piles. It has a body closely resembling that of *Stigeoclonium*, but is without chlorophyll or any trace of an organ resembling a chloroplast. The tip cells of the branches are extremely tenuous and end in a fine point which has been found in most cases to be viscid. These cells fall off easily and become attached by their points to objects in the water. Reversing their polarity, they soon develop into much branched plants reaching a length of 1 cm. or more. This method of vegetative multiplication is the only type of propagation known for this plant. The cell walls do not give the usual positive reactions for either cellulose or chitin with standard tests, but a chemical analysis indicates a closer affinity to cellulose. For nutrition, this plant seems to be dependent on the presence of reducing sugars.-W. C. Coker.

15434. MEAKIN, S. H. Note on a new diatom from Joe's River, Barbadoes. Jour. Quekett Microsc. Club Ser. 4 1(2): 100. 2 pl. 1938.—Ceratodiscus barkerii*.—W. C. Tobie.

15435. NASR, A. H. A contribution to our knowledge of Endosiphonia Zanard., in relation to its systematic position. Bull. Inst. Egypte 20: 124-129. 1 pl., 7 fig. 1937/1938.—A historical review of the systematic position of Endosiphonia is given; the $\mathcal S$ and $\mathcal S$ phases of the alga were established for the first time in the genus. Thorough investigation of the plant led the author to change its systematic position. A . \dot{H} . Nasr .

15436. NASR, A. H. On a new species of the Rhodomelaceae from Egypt. Rev. Algol. 10: 1-7. 8 fig. 1939.—In April 1935, Spirocladia minor was dredged at 40 fathoms at the

entrance of Gulf of Suez.—A. H. Nasr.

15437. PHILSON, PAUL J. The freshwater algae of
North and South Carolina. I. Cyanophyceae. Jour. Elisha
Mitchell Sci. Soc. 55(1): 83-116. 4 pl. 1939.—A total of 56 spp. is reported, including Anabaena parva, Scytonema carolinianum, Tolypothrix delicatula, Calothrix genuflexa, C. braunii var. maxima, and Nostoc ellipsosporum var. minimum. Schizothrix aikenensis (Hypheothrix a. Wolle). Keys. to the families, genera, and species are given.—P. J. Philson.

FUNGI

Editor: C. L. SHEAR. Associate Editor: EDITH K. CASH

(See also in this issue Entries 15144, 15433, 15718, 15727, 15731, 15737, 15761, 15800, 15804, 15805, 15806, 15809, 15810, 15813, 15852, 15881, 15884)

FUNGI

15438. BUTLER, E. J. The occurrences and systematic position of the vesicular-arbuscular type of mycorrhizal fungi. Trans. Brit. Mycol. Soc. 22(3/4): 274-301. 1 pl., 3 fig. 1939.—This form of mycorrhiza was studied on numerous plants from India, the Sudan and England as well as in recent fossils from peat-bogs of Alberta. The fungi were not grown in pure culture although some mycelial proliferation occurred from old hyphae and vesicles. Attention is called to the striking resemblance between these fungi and forms reported by Kidston and Lang from Devonian fossils and by earlier students from fossils of Carboniferous age. It is suggested that the vesicles are organs capable of storing oily material which is later drawn upon by the internal mycelium and transferred to the arbuscles and sporangioles, from which it is emptied into the root cells, perhaps not as fat but rather as some fat soluble accessory substance. Previous suggestions that the fungi concerned are closely related to and probably to be included in the Endogonaceae are endorsed. The earliest valid generic name to be applied to them is *Rhizophagus* Dang. *R.* theae (Zimm.) n. comb., and R. maratriacearum (West) n. comb., are proposed.—G. W. Martin.

15439. CAMPBELL, W. A., and R. W. DAVIDSON. A Poria as the fruiting stage of the fungus causing the sterile conks on birch. *Mycologia* 30(5): 553-560. 3 fig. 1938.— Usually considered a form of some Fomes sp., the authors identify this sterile fungus, so common on living birches in certain localities, as Poria sp.—Courtesy Exp. Sta. Rec.

15440. CANON, HANS, und HANS PLOTT. Die höheren Pilze (Basidiomycetes) des Iglauer Berglandes. Ann. Mycologici 37(1/2): 1-56. 1939.—The occurrence of 739 spp. of Basidiomycetes, listed under 30 families, is reported. This is the result of 20 years' collecting in Bohemian and Moravian territory around the city of Jihlava (Iglau). More

than half the spp. belong in the Agaricaceae.—L. Dosdall. 15441. CARTWRIGHT, K. ST. G. The relation between field and laboratory work in mycology. Trans. Brit. Mycol. Soc. 22(3/4): 222-238. 1939.—The necessity for field work, based on general taxonomic knowledge and including ecological observation, to supplement laboratory study of economic fungi is stressed. Examples are given of cases where conditions under which a fungus has fruited have caused marked departure from its usual macroscopic and microscopic characteristics. The value of culture work as an aid in identification of wood-rotting fungi, especially when combined with study of mycelial structure and physiological reactions, is illustrated by a number of examples. -G. W. Martin.

CHRISTENBERRY, GEORGE A. A study of the 15442. effect of light of various periods and wave lengths on the growth and asexual reproduction of Choanephora cucurbigrowth and asexual reproduction of Choanephora cucurnitarum (Berk, and Rav.) Thaxter. Jour. Elisha Mitchell Sci. Soc. 54(2): 297-310. 2 pl. 1938.—Vegetative growth occurred at approx. the same rate regardless of the light conditions. Yellow light promotes a fluffy, loose aerial mycelium about 8-10 mm. high. Blue and violet light cause the aerial mycelium to be compact. Ultra-violet radiation produces a remarkable effect upon the vegetative mycelium: radiations by a mercury-vapor lamp cause the fungus to grow into the agar, to a degree dependent on the length of the exposure. agar, to a degree dependent on the engin of the exposure. An exposure of 25 min., twice a day, killed germinating spores, and an exposure of 15 min. produced a culture with practically no aerial mycelium. The species can fruit in darkness, but best results are obtained when the light and dark periods are equal. Under ordinary light conditions in the laboratory, the number of sporangia and conidia produced is approx. equal. If the light period is longer than the dark period, the amount of fruiting gradually decreases until none occurs in continuous light except in red-yellow light. Red light (680 m μ and longer) is slightly inhibitive, red-yellow light (608-571 m μ) is stimulative, to fruiting— G. A. Christenberry.

15443. COKER, W. C., and JANE LEITNER. New species of Achlya and Apodachlya. Jour. Elisha Mitchell Sci. Soc. 54(2): 311-318. 2 pl. 1938.—Achlya regularis (p.311) and Apodachlya minima (p.313). Numerous expts. were made with different media and change of temp. to induce the formation of sporangia in A. minima but without success. Egg germination in A. minima was observed.—Authors.

15444. COUCH, J. N. A new species of Chytridium from Mountain Lake, Virginia. Jour. Elisha Mitchell Sci. Soc. 54 (2): 256-259. 1 pl. 1938.—C. oedogonii from Oedogonium.— J. N. Couch

15445. COUCH, JOHN N. Technic for collection, isolation and culture of chytrids. Jour. Elisha Mitchell Sci. Soc. 55(1): 208-214. 1939.—Methods are described by which 15 representative spp. from all the larger groups of the

Chytridiales and related forms have been isolated and cultured, some for as long as 7 years. All of these forms have been isolated by a single sporangium, or a single spore, or pure threads and hence the cultures descended from such isolations are known to consist of a single fungal strain. In addition to the usual substrata, as boiled leaves and pollen, 4 spp. have been grown on boiled filter paper in water. In such cultures bacteria have been present. Indeed, bacteria seem necessary for their growth. 4 spp. of monocentric chytrids. Rhizidiomyces apophysatus, Rhizophidium carpophilum, R. multiporum and R. n. sp., have been carried on agar in pure culture through several generations. In most of the chytrids tested the spores germinated and grew best on agars with small amts. of nutrients or even on plain agar.—J. N. Couch.

15446. DIEHL, WILLIAM W. Virginia records for three rarely known fungi. Claytonia 5(3): 30-32. 1939.—Aplopsora nyssae, Puccinia aletridis and Boletinus squarrosoides were found in a bog near Petersburg, Va. The last sp. has been found only once before.—R. S. Freer.

15447. GREGORY, P. H. Sclerotinia polyblastis n. sp. on

narcissus, the perfect stage of Botrytis polyblastis Dowson.

Trans. Brit. Mycol. Soc. 22(1/2): 201-203. 1938.—Apothecia of a Sclerotinia were found on over-wintered leaves of narcissus which had been killed by Botrytis polyblastis infection the preceding year. Ascospore cultures resembled cultures from conidia of *B. polyblastis* but conidia were not produced on artificial media. Inoculation of narcissus flowers with ascospores resulted in lesions on which typical conidia of B. polyblastis were produced. A diagnosis is given.-F. Weiss

15448. HANNA, W. F. Coprinus urticaecola on stems of Marquis wheat. Mycologia 31(3): 250-257. 2 fig. 1939.—C. urticaecola* was found at Winnipeg in 1934 on Marquis wheat. The fruit-bodies were attached near the ground level to leaf sheaths of green plants. In 1937 the species was collected again on decaying nettle stems. It is considered to be identical with C. brassicae Peck and C. phaeosporus Karst. sensu Lange. Spore germination and growth of the mycelium occurred readily on potato-dextrose agar. The species fruited on a number of sterile media, but fruit-bedies foiled to appear when wheat the control of the bodies failed to appear when wheat plants growing in the greenhouse were inoculated with pure cultures of the mycelium. C. urticaecola is heterothallic and bisexual. The diploid mycelium bears clamp connections. Small sclerotia were formed on one of the diploid cultures growing on potato-dextrose agar.—W. F. Hanna.

15449. HERRICK, J. ARTHUR. Growth and variability

of Stereum gausapatum in culture. Phytopath. 29(6): 504-511. 3 fig. 1939.—The growth and variability of S. gausapatum were investigated by culturing the organism on agar. The 58 isolates used represent collections made throughout the Northeastern U. S. Transfers made from old agar cultures or from cultures recently derived from old agar cultures grew in an unpredictable fashion. A sufficient number of successive transfers, made at short intervals, gave rise to cultures of predictable behavior. The number of successive transfers necessary to produce such results varied widely among the 58 isolates. An intensive study of cultural variations in 12 selected isolates was made by growing the organism in Petri plates at 25° C. The cultures varied widely in their growth rate, as well as in the character and color of the mycelium. The various isolates remained constant in their cultural characteristics during nearly 2 years' duration of the study.—J. A. Herrick.

15450. HORNBOSTEL, W. Kann Beauveria densa (Link) auch die Eier des Maikäfers befallen? Zeitschr. Pflanzenkr. 49(3): 142-144. 1939.—B. densa attacks larvae, pupae, and adults of June beetles, and these expts. demonstrate that it may attack the eggs as well. 12 days after inoculation, at 10 and 22-27°C, the egg membrane was dark colored and covered by the mycelium, and a light pressure broke the eggs and allowed a milky fluid to exude. Beauveria was reisolated. The Cordyceps-like coremia of the fungus formed on the egg 4-6 weeks after inoculation. Coremia also occur on larvae and beetles and in potato or agar cultures.—H.

15451. JENKINS, ANNA E. New species of Taphrina on red maple and on silver maple. Jour. Washington Acad. Sci. 29(5): 222-230. 4 fig. 1939.—T. dearnessii* on Acer rubrum,

Alabama, Michigan, Ontario, New York, North Carolina, and Pennsylvania; and T. carveri* on A. saccharinum, Ontario, Alabama and Michigan.—A. E. Jenkins.

15452. KARLING, J. S. A note on Phlyctidium. Mycologia 286-287. 1939.—TYLOCHYTRIUM (Phlyctidium

Braun, preoc.).

15453. KIRSCHSTEIN, W. Über neue, seltene und kritische Ascomyceten und Fungi Imperfecti II. Ann. Mycologici 37(1/2): 88-140. 1939.—Most of the 77 fungi discussed are described as new spp. The family NIES-SLIACEAE (Sphaeriales) is erected with 12 genera (key given) including ACANTHOSPHAERIA, PLEOSTIGMA, OPHIOSPHAERIA, and MELANOSTIGMA as new genera. The following new genera are also erected: STEREO-SPHAERIA, ABAPHOSPORA, ZOPFINULA (Amphi-SPHAERIA. sphaeriaceae); PHAEASPIS, MELANOPELTA (Clypeo-PSEUDOTRICHIA (Trichosphaeriaceae) sphaeriaceae) LUDWIGOMYCES (Ascocorticiaceae); MOLLISIASTER (Mollisiaceae); KLEBAHNOPYCNIS (Fungi Imperfecti). New species are described in the following genera: Acanthostigma, Helminthosphaeria, Melanopsamma, Neopeckia, stigma, Helminthosphaeria, Melanopsamma, Neopeckia, Ceratosphaeria, Amphisphaeria, Trematosphaeria, Teichospora, Nitschkia, Sphaerella, Saccothecium, Physalospora, Metasphaeria, Leptosphaeria, Chaetopyrena, Pleospora, Pyrenophora, Clathrospora, Massaria, Massariopsis, Phomatospora, Gnomonia, Gnomoniopsis, Cryptosporella, Nectria, Phaeonectria, Calonectria, Exarmidium. Rhopographus, Homostegia, Phoma, Pyrenochaeta, Vermicularia, Rhabdospora, Hendersonia, Sacidium, Oospora, Heterosporium, Dendrodochium, Volutella, Haplosporella, Belonidium, Discorphmia, Calosporella, Mucatodea, Valsella, Calosphaeria. rehmia, Calosporella, Mycotodea, Valsella, Calosphaeria, Isaria, Fusarium, Septoria, Coniothyrium, Pezizella. Fusarium nectricreans is assumed to be connected with Nectria rubicunda, with which it was found associated on decaying stems of garden plants. Ludwigomyces parasiticus is supposed to be parasitic on a myxomycete. The fungi were collected in Germany.—L. Dosdall.

15454. LEDINGHAM, G. A. Studies on Polymyxa grami-

nis, n. gen., n. sp., a plasmodiophoraceous root parasite of Canadian Jour. Res. Sect. C 17(2): 38-51, 4 pl., 3 fig. 1939.—The species was found parasitizing the roots of wheat grown in soil from 3 localities in Ontario. In addition to spore clusters of the *Ligniera* type, large, septate zoosporangia with conspicuous tubes for zoospore discharge are present. These multinucleate zoosporangia are produced by progressive lobular outgrowths from uninucleate amoebae and from the beginning are always surrounded by a thin wall. In the formation of resting spores, naked multinucleate myxamoebae develop first, then segment to form spore clusters without formation of a sporal membrane. Both zoosporangia and resting spores produce identical zoospores with 2 flagella of unequal length. The somatic nuclear divisions in the growing myxamoebae are characterized by the simultaneous division of both the nucleolus and chromatin within a persistent nuclear membrane. During the transitional phase which follows, the nucleolus disappears and at the same time there is an intensification of the staining properties of the surrounding cytoplasm. Prior to segmentation of the myxamoebae to form the spore clusters, and in all divi-sions during growth of the zoosporangia, the nucleoli and nuclear membranes disappear, and divisions are of ordinary mitotic type. Relationship with the Plasmodiophorales is indicated by the form of the resting spore clusters, the method of nuclear division during growth of the myxamoe-bae, and the characteristic flagellation of the zoospore.—

Auth. abst.

15455. MAINS, E. B. Scopella gen. nov. of the Pucciniaceae. Ann. Mycologici 37(1/2): 57-60. 1939.—Uromyces echinulatus Niessl and Uredo sapotae Arth. & Johnst. Pycnia subcuticular; uredia and telia subepidermal; teliospores 1-celled, thin-walled, without a pore, pedicellate on basal cells.—G. B. Cummins.

15456. MAINS, E. B. Cordyceps from the mountains of North Carolina and Tennessee. Jour. Elisha Mitchell Sci. Soc. 55(1): 117-129. 4 pl. 1939.—20 spp. are described and discussed, incl. C. thaxteri on spiders, C. hesleri on cicadas, and C. smithii* from a wasp.—E. B. Mains.

15457. OLIVEIRA, B. d'. [New hosts for the aecidial stage of Uromyces graminis (Niessl) Diet.] Bol. Soc. Broteriana 13: 81-89. 2 pl. 1938.—The author claims to have

established the relationship of Accidium foeniculi (=A. umbelliferarum) to U. graminis on Melica ciliata and the heterothallism of the fungus. Sporidia were successfully inoculated into 15 spp. of 12 umbelliferous genera.-Cour-

tesy Exp. Sta. Rec.

15458. PADWICK, G. WATTS. The genus Fusarium. I. Known occurrence in India. Indian Jour. Agric. Sci. 9(2): 171-184. 1939.—The occurrence of Fusarium in India is discussed, the species being listed under the sections accepted by Wollenweber. Only 6 of Wollenweber's 16 sections are represented in India, and only 15 of the 65 species. 12 plant diseases in India have been shown to be due to Fusarium, 7 being wilt diseases and 6 of these being caused by Fusarium spp. of the section Elegans. The confusion existing in the genus is indicated by the large number of changes in names in spite of the fact that most of the work has been done quite recently. In the cases of several crops in India one plant may be attacked by 2 or 3 different spp. of Fusarium, which greatly complicates the problem of identification. The present concept of the species with special reference to the genus is discussed at length; for the present it seems undesirable to use biological characters such as host reaction for species delimitation, but such characters should be given a lower rank. The paper is a review

of the problem preliminary to exptl. study.—G. W. Padwick. 15459. ROGERS, DONALD P. The genus Hypochnus and Fries's Observationes. Mycologia 31(3): 297-307. 1939.—An 1824 edition of Fries's Observationes mycologicae, in which Hypochnus is sometimes thought to have been validly published, is spurious; the 2 copies extant are specimens of the 1815-18 edition with a new title-page tipped in. The valid publication of the genus is that in the Systema mycologicum; and this Hypochnus is composed of lichens. The name Hypochnus is then not available for any of the various groups of fungi to which it is applied. Hypochnus Fries emendavit Karsten is Coniophora or Coniophorella; Tomentella is the valid name of Hypochnus sensu Burt; Peniophora or Corticium for Hypochnus sensu Patouillard; Hypochnus of other authors is incapable of polite characterization.-

D. P. Rogers.

15460. SEAVER, FRED J. Photographs and descriptions of cup-fungi—XXXII. Podophacidium. Mycologia 31(3): 350-353.1 fig. 1939.—P. xanthomelum* descr.

15461. SHANOR, LELAND. Studies in the genus Olpidiopsis. I. Resting spore germination in a new species. II. The relationship of Pseudolpidium Fischer and Olpidiopsis (Cornu) Fischer. Jour. Elisha Mitchell Sci. Soc. 55(1): 167-(Cornu) Fischer. Jour. Etasha Mucheu Sci. Soc. 35(1): 101-195. 2 pl., 4 fig. 1939.—I. Olpidiopsis varians is described (p. 171). Most of its zoosporangia and companion cells are spiny. Germination of its resting spores is described—apparently the first description of germination of resting spores of an authentic species of Olpidiopsis. A long dormant the first description is programs. In this species there period after fertilization is necessary. In this species there is usually formed a germination tube which penetrates the companion cell and biciliate zoospores are liberated. These show no apparent difference from the zoospores released by zoosporangium germination.—II. In a monosporangial and single-spore isolation study of collections originally appearing to be spp. of *Pseudolpidium* and *Olpidiopsis*, all isolates appearing as *Pseudolpidium* have, by continued cultural study, turned out to be *Olpidiopsis*. The spiny resting spores described for *Pseudolpidium* have been found to be either the spiny zoosporangia or misinterpreted resting spores of the various Olpidiopsis spp. P. saprolegniae is not a specific fungus but a combination of sporangial forms of authentic spp. of Olpidiopsis. O. minor and P. fusiforme, should be recombined under O. fusiformis Cornu. So-called P. aphanomycis resting spores appear to be only inadvantageously oriented O. luxurians resting spores or those whose companion cell has collapsed. The remaining Pseudolpidium spp. are reviewed and their status discussed. The continuance of the genus seems to rest on only 2 spp., P. pythii and P. gracile, both by Butler, but these should be studied further.—L. Shanor.

15462. SINGER, R. Studien zur Systematik der Basidiomyceten. I. Beih. Bot. Centralbl. Abt. B. 56(1/2): 137-156. 2 fig. 1936.—Panus Fries is made up of heterogeneous elements which are to be distributed in the following genera: Panellus Karst. em., in which are included P. stipticus, P. mitis, and P. violaceofulvus; Panus Fries sens. constr., to occurred from old hyphae and vesicles. Attention is called to the striking resemblance between these fungi and forms reported by Kidston and Lang from Devonian fossils and by earlier students from fossils of Carboniferous age. It is suggested that the vesicles are organs capable of storing oily material which is later drawn upon by the internal mycelium and transferred to the arbuscles and sporangioles, from which it is emptied into the root cells, perhaps not as fat but rather as some fat soluble accessory substance. Previous suggestions that the fungi concerned are closely related to and probably to be included in the Endogonaceae are endorsed. The earliest valid generic name to be applied to them is *Rhizophagus* Dang. R. theae (Zimm.) n. comb., and R. marattiacearum (West) n. comb., are proposed.—G. W. Martin.

15439. CAMPBELL, W. A., and R. W. DAVIDSON. A Poria as the fruiting stage of the fungus causing the sterile conks on birch. Mycologia 30(5): 553-560. 3 fig. 1938.— Usually considered a form of some Fomes sp., the authors identify this sterile fungus, so common on living birches in certain localities, as Poria sp.—Courtesy Exp. Sta. Rec.

15440. CANON, HANS, und HANS PLOTT. Die höheren Pilze (Basidiomycetes) des Iglauer Berglandes. Ann. Mycologici 37(1/2): 1-56. 1939.—The occurrence of 739 spp. of Basidiomycetes, listed under 30 families, is reported. This is the result of 20 years' collecting in Bohemian and Moravian territory around the city of Jihlava (Iglau). More

than half the spp. belong in the Agaricaceae.—L. Dosdall. 15441. CARTWRIGHT, K. ST. G. The relation between field and laboratory work in mycology. Trans. Brit. Mycol. Soc. 22(3/4): 222-238. 1939.—The necessity for field work, based on general taxonomic knowledge and including ecological observation, to supplement laboratory study of economic fungi is stressed. Examples are given of cases where conditions under which a fungus has fruited have caused marked departure from its usual macroscopic and microscopic characteristics. The value of culture work as an aid in identification of wood-rotting fungi, especially when combined with study of mycelial structure and physiological reactions, is illustrated by a number of examples. -G. W. Martin.

15442. CHRISTENBERRY, GEORGE A. A study of the effect of light of various periods and wave lengths on the growth and asexual reproduction of Choanephora cucurbigrowth and asexual reproduction of Choanephora cucurbitarum (Berk, and Rav.) Thaxter. Jour. Elisha Mitchell Sci. Soc. 54(2): 297-310. 2 pl. 1938.—Vegetative growth occurred at approx. the same rate regardless of the light conditions. Yellow light promotes a fluffy, loose aerial mycelium about 8-10 mm. high. Blue and violet light cause the aerial mycelium to be compact. Ultra-violet radiation produces a grant produced to the vegetative mycelium. remarkable effect upon the vegetative mycelium: radiations by a mercury-vapor lamp cause the fungus to grow into the agar, to a degree dependent on the length of the exposure. An exposure of 25 min., twice a day, killed germinating spores, and an exposure of 15 min. produced a culture with practically no aerial mycelium. The species can fruit in darkness, but best results are obtained when the light and dark periods are equal. Under ordinary light conditions in the laboratory, the number of sporangia and conidia produced is approx. equal. If the light period is longer than the dark period, the amount of fruiting gradually decreases until none occurs in continuous light except in red-yellow light. Red light (680 m μ and longer) is slightly inhibitive, red-yellow light (608-571 m μ) is stimulative, to fruiting.—

G. A. Christenberry.

15443. COKER, W. C., and JANE LEITNER. New species of Achlya and Apodachlya. Jour. Elisha Mitchell Sci. Soc. 54(2): 311-318. 2 pl. 1938.—Achlya regularis (p.311) and Apodachlya minima (p.313). Numerous expts. were made with different media and change of temp. to induce the formation of sporangia in A. minima but without success. Egg germination in A. minima was observed.—Authors.

15444. COUCH, J. N. A new species of Chytridium from Mountain Lake, Virginia. Jour. Elisha Mitchell Sci. Soc. 54 (2): 256-259. 1 pl. 1938.—C. oedogonii from Oedogonium.— J. N. Couch

15445. COUCH, JOHN N. Technic for collection, isolation and culture of chytrids. Jour. Elisha Mitchell Sci. Soc. 55(1): 208-214. 1939.—Methods are described by which 15 representative spp. from all the larger groups of the

Chytridiales and related forms have been isolated and cultured, some for as long as 7 years. All of these forms have been isolated by a single sporangium, or a single spore, or pure threads and hence the cultures descended from such isolations are known to consist of a single fungal strain. In addition to the usual substrata, as boiled leaves and pollen, 4 spp. have been grown on boiled filter paper in water. In such cultures bacteria have been present. Indeed, bacteria seem necessary for their growth. 4 spp. of monocentric chytrids. Rhizidiomyces apophysatus, Rhizophidium carpophilum, R. multiporum and R. n. sp., have been carried on agar in pure culture through several generations. In most of the chytrids tested the spores germinated and grew best on agars with small amts. of nutrients or even on plain agar.—J. N. Couch.

15446. DIEHL, WILLIAM W. Virginia records for three rarely known fungi. Claytonia 5(3): 30-32. 1939.—Aplopsora nyssae, Puccinia aletridis and Boletinus squarrosoides were found in a bog near Petersburg, Va. The last sp. has been found only once before.—R. S. Freer.

15447. GREGORY, P. H. Sclerotinia polyblastis n. sp. on

narcissus, the perfect stage of Botrytis polyblastis Dowson. Trans. Brit. Mycol. Soc. 22(1/2): 201-203. 1938.—Apothecia of a Sclerotinia were found on over-wintered leaves of narcissus which had been killed by Botrytis polyblastis infection the preceding year. Ascospore cultures resembled cultures from conidia of *B. polyblastis* but conidia were not produced on artificial media. Inoculation of narcissus flowers with ascospores resulted in lesions on which typical conidia of B. polyblastis were produced. A diagnosis is given.-F. Weiss.

15448. HANNA, W. F. Coprinus urticaecola on stems of Marquis wheat. Mycologia 31(3): 250-257. 2 fig. 1939.—C. urticaecola* was found at Winnipeg in 1934 on Marquis wheat. The fruit-bodies were attached near the ground level to leaf sheaths of green plants. In 1937 the species was collected again on decaying nettle stems. It is considered to be identical with *C. brassicae* Peck and *C. phaeosporus* Karst. sensu Lange. Spore germination and growth of the mycelium occurred readily on potato-dextrose agar. The species fruited on a number of sterile media, but fruitbodies failed to appear when wheat plants growing in the greenhouse were inoculated with pure cultures of the mycelium. C. urticaecola is heterothallic and bisexual. The diploid mycelium bears clamp connections. Small sclerotia

were formed on one of the diploid cultures growing on potato-dextrose agar.—W. F. Hanna.

15449. HERRICK, J. ARTHUR. Growth and variability of Stereum gausapatum in culture. Phytopath. 29(6): 504-511. 3 fig. 1939.—The growth and variability of S. gausapatum were investigated by culturing the organism on agar. The 58 isolates used represent collections made throughout the Northeastern U. S. Transfers made from old agar cultures or from cultures recently derived from old agar cultures grew in an unpredictable fashion. A sufficient number of successive transfers, made at short intervals, gave rise to cultures of predictable behavior. The number of successive transfers necessary to produce such results varied widely among the 58 isolates. An intensive study of cultural variations in 12 selected isolates was made by growing the organism in Petri plates at 25° C. The cultures varied widely in their growth rate, as well as in the character and color of the mycelium. The various isolates remained constant in their cultural characteristics during nearly 2 years' duration of the study.—J. A. Herrick.

15450. HORNBOSTEL, W. Kann Beauveria densa (Link) auch die Eier des Maikäfers befallen? Zeitschr. Pflanzenkr. 49(3): 142-144. 1939.—B. densa attacks larvae, pupae, and adults of June beetles, and these expts, demonstrate that it may attack the eggs as well. 12 days after inoculation, at 10 and 22-27°C, the egg membrane was dark colored and covered by the mycelium, and a light pressure broke the eggs and allowed a milky fluid to exude. Beauveria was reisolated. The Cordyceps-like coremia of the fungus formed on the egg 4-6 weeks after inoculation. Coremia also occur on larvae and beetles and in potato or agar cultures.—H.

15451. JENKINS, ANNA E. New species of Taphrina on red maple and on silver maple. Jour. Washington Acad. Sci. 29(5): 222-230. 4 fig. 1939.—T. dearnessii* on Acer rubrum, Alabama, Michigan, Ontario, New York, North Carolina, and Pennsylvania; and T. carveri* on A. saccharinum, Ontario, Alabama and Michigan.—A. E. Jenkins.

15452. KARLING, J. S. A note on Phlyctidium. Mycologia 286-287. 1939.—TYLOCHYTRIUM (Phlyctidium

Braun, preoc.).

15453. KIRSCHSTEIN, W. Über neue, seltene und kritische Ascomyceten und Fungi Imperfecti II. Ann. Mycologici 37(1/2): 88-140. 1939.—Most of the 77 fungi discussed are described as new spp. The family NIES-SLIACEAE (Sphaeriales) is erected with 12 genera (key given) including ACANTHOSPHAERIA, PLEOSTIGMA, OPHIOSPHAERIA, and MELANOSTIGMA as new genera. The following new genera are also erected: STEREO-SPHAERIA, ABAPHOSPORA, ZOPFINULA (Amphisphaeriaceae); PHAEASPIS, MELANOPELTA (Clypeo-PSEUDOTRICHIA (Trichosphaeriaceae) sphaeriaceae) LUDWIGOMYCES (Ascocorticiaceae); MOLLISIASTER (Mollisiaceae); KLEBAHNOPYCNIS (Fungi Imperfecti). New species are described in the following genera: Acanthostigma, Helminthosphaeria, Melanopsamma, Neopeckia, Styma, Heimannosphaeria, Meimopsammi, Neopechau, Ceratosphaeria, Amphisphaeria, Trematosphaeria, Teichospora, Nitschkia, Sphaerella, Saccothecium, Physalospora, Metasphaeria, Leptosphaeria, Chaetopyrena, Pleospora, Pyrenophora, Clathrospora, Massaria, Massariopsis, Phomatospora, Gnomonia, Gnomoniopsis, Cryptosporella, Nectria, Phaeonectria, Calonectria, Exarmidium. Rhopographus, Homostegia, Phoma, Pyrenochaeta, Vermicularia, Rhabdo-spora, Hendersonia, Sacidium, Oospora, Heterosporium, Dendrodochium, Volutella, Haplosporella, Belonidium, Discorehmia, Calosporella, Mycotodea, Valsella, Calosphaeria, Isaria, Fusarium, Septoria, Coniothyrium, Pezizella. Fusarium nectricreans is assumed to be connected with Nectria rubicunda, with which it was found associated on decaying stems of garden plants. Ludwigomyces parasiticus is supposed to be parasitic on a myxomycete. The fungi were collected in Germany.—L. Dosdall.

15454. LEDINGHAM, G. A. Studies on Polymyxa graminis, n. gen., n. sp., a plasmodiophoraceous root parasite of wheat. Canadian Jour. Res. Sect. C 17(2): 38-51. 4 pl., 3 fig. 1939.—The species was found parasitizing the roots of wheat grown in soil from 3 localities in Ontario. In addition to spore clusters of the *Ligniera* type, large, septate zoosporangia with conspicuous tubes for zoospore discharge are present. These multinucleate zoosporangia are produced by progressive lobular outgrowths from uninucleate amoebae and from the beginning are always surrounded by a thin wall. In the formation of resting spores, naked multinucleate myxamoebae develop first, then segment to form spore clusters without formation of a sporal membrane. Both zoosporangia and resting spores produce identical zoospores with 2 flagella of unequal length. The somatic nuclear divisions in the growing myxamoebae are characterized by the simultaneous division of both the nucleolus and chromatin within a persistent nuclear membrane. During the transitional phase which follows, the nucleolus disappears and at the same time there is an intensification of the staining properties of the surrounding cytoplasm. Prior to segmentation of the myxamoebae to form the spore clusters, and in all divisions during growth of the zoosporangia, the nucleoli and nuclear membranes disappear, and divisions are of ordinary mitotic type. Relationship with the Plasmodiophorales is indicated by the form of the resting spore clusters, the method of nuclear division during growth of the myxamoebae, and the characteristic flagellation of the zoospore.-Auth. abst.

15455. MAINS, E. B. Scopella gen. nov. of the Pucciniaceae. Ann. Mycologici 37(1/2): 57-60. 1939.—Uromyces echinulatus Niessl and Uredo sapotae Arth. & Johnst. Pycnia subcuticular; uredia and telia subepidermal; teliospores 1-celled, thin-walled, without a pore, pedicellate on basal cells.—G. B. Cummins.

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D. P. Rogers.

15460. SEAVER, FRED J. Photographs and descriptions cup-fungi—XXXII. Podophacidium. Mycologia 31(3):

350-353.1 fig. 1939.—P. xanthomelum* descr.
15461. SHANOR, LELAND. Studies in the genus Olpidiopsis. I. Resting spore germination in a new species. II. The relationship of Pseudolpidium Fischer and Olpidiopsis (Cornu) Fischer. Jour. Elisha Mitchell Sci. Soc. 55(1): 167-195. 2 pl., 4 fig. 1939.—I. Olpidiopsis varians is described (p. 171). Most of its zoosporangia and companion cells are spiny. Germination of its resting spores is described—apparently the first description of germination of resting spores of an authentic species of Olpidiopsis. A long dormant period after fertilization is necessary. In this species there is usually formed a germination tube which penetrates the companion cell and biciliate zoospores are liberated. These show no apparent difference from the zoospores released by zoosporangium germination.—II. In a monosporangial and single-spore isolation study of collections originally appearing to be spp. of *Pseudolpidium* and *Olpidiopsis*, all isolates appearing as *Pseudolpidium* have, by continued cultural study, turned out to be *Olpidiopsis*. The spiny resting spores described for Pseudolpidium have been found to be either the spiny zoosporangia or misinterpreted resting spores of the various Olpidiopsis spp. P. saprolegniae is not a specific fungus but a combination of sporangial forms of authentic spp. of Olpidiopsis. O. minor and P. fusiforme, should be recombined under O. fusiformis Cornu. So-called P. aphanomycis resting spores appear to be only inadvantageously oriented O. luxurians resting spores or those whose companion cell has collapsed. The remaining Pseudolpidium spp. are reviewed and their status discussed. The continuance of the genus seems to rest on only 2 spp., P. pythii and P. gracile, both by Butler, but these should be studied further.—L. Shanor.

15462. SINGER, R. Studien zur Systematik der Basidiomyceten. I. Beih. Bot. Centralbl. Abt. B. 56(1/2): 137-156. 2 fig. 1936.—Panus Fries is made up of heterogeneous elements which are to be distributed in the following genera: Panellus Karst. em., in which are included P. stipticus, P. mitis, and P. violaceofulvus; Panus Fries sens. constr., to which P. conchatus, P. rudis, and P. semirudis belong; Phyllotopsis, in which are placed Agaricus nidulans and Claudo-pus subnidulans; Tectella, a monotypic genus which includes T. patellaris; and Velanopus.—Galeropsis is a gasteromycete which shows great affinity with Conocybe, Bolbitius, Tubariopsis and above all Cyttarophyllum—A subsection Virescentinae of the section Rigidae Fries in the genus Russula has been established which proves to be more primitive than the Lepidinae. Diagrams showing the relationship of subsections and of the spp. in the subsection Virescentinae are given and Russula septentrionalis described.—The tematic position of Marasmius perforans is uncertain. Microchemical studies indicate a relationship with the Rameales, macroscopically everything indicates the Androsacei. There are many indications of an affinity with M, foetidus. A microscopic analysis of M, haematocephalus shows that it belongs to the Hygrometrici. Hosts with the spp. of the section occurring on each are listed.—Some evidence of relationship between the coralloid Hydnaceae and the Clavariae is presented. The juvenile stages of Dryodon coral-lioides faithfully repeat the development of the series which leads from the branched Clavariae through Hericium-like forms to the coralloid Hydnaceae and which is further supported by the common possession of amyloid spores.— H. F. Bergman.

15463. SMITH, ALEXANDER H., and L. R. HESLER. Notes on agarics from Tennessee and North Carolina. Jour. Elisha Mitchell Sci. Soc. 54(2): 261-269. 2 pl., 1 fig. 1938.— Of 10 unusual species of the Agaricaceae reported, 5 have been found both on the Pacific coast and in the southern Appalachian Mts. Critical data on the identity of 5 species are also given .- A. H. Smith.

15464. SPRAGUE, R., and W. B. COOKE. Some Fungi Imperfecti from the Pacific Northwest. Mycologia 31(1): 43-52. 2 fig. 1939.—Includes new taxonomy in the genera Naemosphaeria, Placosphaeria, Robillarda, Heteropatella,

Septoria, and Macrosporium.

15465. STEPHENS, FRANCES L. Note on cultures of Sphaerobolus stellatus Tode. Trans. Brit. Mycol. Soc. 22 (3/4): 268. 1 fig. 1939.—Fruited on potato dextrose and malt agar.—G. W. Martin.

15466. SWOBODA, FRANZ. Zur Anatomie und Fruchtkörperentwicklung von Scleroderma Pers. Ann. Mycologici 37(1/2): 141-153. 3 fig. 1939.—Free-hand sections of the fruiting bodies of S. aurantium and S. verrucosum in various stages of development were studied. Peridium and gleba develop from a common primordial tissue. Peridium and stalk consist of a more or less firmly interwoven network of bundles of hyphae. In section this gives the appearance of groups of plectenchymatous areas interspersed with pseudoparenchymatous areas. The term heteroplectenchymatous is proposed to describe such structure. This heteroplectenchyma is more distinct in the stalk region than in the peridium, and in S. verrucosum than in S. aurantium. This structure is considered homologous with that of the gleba. In the latter the end cells of the knotted hyphae develop into basidia while in the peridium they continue to grow as vegetative hyphae forming the network of tissue whose primary function is mechanical. The very young basidiocarp is surrounded by a loose weft of hyphae considered the primary volva. After the formation of the peridium this tissue gives rise to the warts and the scales of the latter.-L. Dosdall.

15467. TIFFNEY, WESLEY N. The identity of certain species of the Saprolegniaceae parasitic to fish. Jour. Elisha Mitchell Sci. Soc. 55(1): 134-151. 1939.—128 strains of Saprolegniaceae were isolated in southern New England from living diseased aquatic animals: 122 Saprolegnia parasitica, 2 S. ferax, 2 Achlya flagellata, 1 sterile Achlya sp. and 1 sterile Dictyuchus sp. Representative strains were obtained in pure culture and their pathogenicity was verified by controlled inoculations. Strains of S. parasitica were compared with a subculture of Coker's type culture. Intensive study showed that the variations displayed in vegetative and asexual reproductive structures should serve only to extend the range of variation possible within the species. S. parasitica var. kochhari is considered to have been established on an inadequate basis. The renewal of zoösporangia by cymose branching was found to be a more variable and therefore less significant character than has been thought, consequently the writer prefers not to accept the transfer of Saprolegnia parasitica to the genus Isoachlya.—W. N.

Tiffney.

TYLER, L. J. Variation in Sphacelotheca sorghi 15468 (Link) Clinton. Minnesota Agric. Exp. Sta. Tech. Bull. 133. 1-48. 10 fig. 1938.—Germinating chlamydospores of the covered smut fungus of sorghums are described and illustrated. The associated cytological phenomena indicate a far greater variability and more deviation from normal type than hitherto supposed. Essentially, the life cycle was like that of several spp. of *Ushilago*. Using sporidial fusions and the Bauch test for determining sex in *S. sorghi*, evidence was obtained that the sexual compatibility of paired lines may be determined soon after inoculation. Segregation for sex factors was apparently complete in the 1st or 2d nuclear divisions of the germinating spore. Two sex groups were found, and the sex factors segregated in the 2:2 and 1:3 ratios. Some data indicated that there are more than 2 sexual compatibility groups. 4 ratios of factor segregation for cultural characters (independent of segregation for sex characters) were found, viz., 2:2, 4:0, 3:1, and 2:1:1. Artificially cultured, S. sorghi comprises an indefinite number of cultural types differing in one or more cultural characters. which are discussed in detail. Nutrients appeared to affect the rate of sectoring, malt agar and plain sugar media plus nutrient salts appearing to induce sectoring. Some lines sectored abundantly, others only rarely. For more than a year 14 lines remained culturally constant when grown on potato-dextrose agar, but 8 of them produced one or more sectors of new cultural type when later grown on malt agar. Lines arising through intraspecific hybridization between monosporidial lines from different chlamydospores differed in pathogenicity as indicated by stunting, color of peridia, size and hardness of smut balls, size of chlamydospores, and length of time required for chlamydospore germination. A bibliography of 47 entries is included.—Courtesy Exp. Sta. Rec.

15469. VERONA, ONORATO, e RAFFAELE CIFERRI. Considerazioni critiche e sistematiche sul gen. "Pseudomycoderma Will." [The genus Pseudomycoderma.] Nuovo Gior. Bot. Ital. 45(1): clxxix-clxxxiii. 1938(1939).—Pseudomycoderma as a genus was described by Will in 1916, who included it with the genera Torula, Eutorula, and Mycotorula in the Torulaceae. The genus, since then variously delimited by authors, is more properly a sub-genus of Geotrichum Link, including such species as have a well-

developed mycelium.-F. Ramaley.

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BRYOPHYTA

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SPERMATOPHYTA

FRANCIS W. PENNELL, Editor

(See also in this issue Entries 14345, 14355, 14365, 15526, 15624, 15636)

GENERAL

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which P. conchatus, P. rudis, and P. semirudis belong; Phyllotopsis, in which are placed Agaricus nidulans and Claudopus subnidulans; Tectella, a monotypic genus which includes T. patellaris; and Velanopus.—Galeropsis is a gasteromycete which shows great affinity with Conocybe, Bolbitus, Tubariopsis and above all Cyttarophyllum.—A subsection Virescentinae of the section Rigidae Fries in the genus Russula has been established which proves to be more primitive than the Lepidinae. Diagrams showing the relationship of subsections and of the spp. in the subsection Virescentinae are given and Russula septentrionalis described.—The systematic position of Marasmius perforans is uncertain. Microchemical studies indicate a relationship with the Rameales, macroscopically everything indicates the Androsacei. are many indications of an affinity with M. foetidus. A microscopic analysis of M. haematocephalus shows that it belongs to the Hygrometrici. Hosts with the spp. of the section occurring on each are listed.—Some evidence of relationship between the coralloid Hydnaceae and the Clavariae is presented. The juvenile stages of Dryodon corallioides faithfully repeat the development of the series which leads from the branched Clavariae through Hericium-like forms to the coralloid Hydnaceae and which is further supported by the common possession of amyloid spores.— H. F. Bergman.

15463. SMITH, ALEXANDER H., and L. R. HESLER. Notes on agarics from Tennessee and North Carolina. Jour. Elisha Mitchell Sci. Soc. 54(2): 261-269. 2 pl., 1 fig. 1938.— Of 10 unusual species of the Agaricaceae reported, 5 have been found both on the Pacific coast and in the southern Appalachian Mts. Critical data on the identity of 5 species are also given.—A. H. Smith.

15464. SPRAGUE, R., and W. B. COOKE. Some Fungi Imperfecti from the Pacific Northwest. Mycologia 31(1): 43-52. 2 fig. 1939.—Includes new taxonomy in the genera Naemosphaeria, Placosphaeria, Robillarda, Heteropatella, Septoria, and Macrosporium.

15465. STEPHENS, FRANCES L. Note on cultures of Sphaerobolus stellatus Tode. Trans. Brit. Mycol. Soc. 22 (3/4): 268. 1 fig. 1939.—Fruited on potato dextrose and malt agar.—G. W. Martin.

15466. SWOBODA, FRANZ. Zur Anatomie und Fruchtkörperentwicklung von Scleroderma Pers. Ann. Mycologici 37(1/2): 141-153. 3 fig. 1939.—Free-hand sections of the fruiting bodies of S. aurantium and S. verrucosum in various stages of development were studied. Peridium and gleba develop from a common primordial tissue. Peridium and stalk consist of a more or less firmly interwoven network of bundles of hyphae. In section this gives the appearance of groups of plectenchymatous areas interspersed with pseudoparenchymatous areas. The term heteroplectenchymatous is proposed to describe such structure. This heteroplectenchyma is more distinct in the stalk region than in the peridium, and in S. verrucosum than in S. aurantium. This structure is considered homologous with that of the gleba. In the latter the end cells of the knotted hyphae develop into basidia while in the peridium they continue to grow as vegetative hyphae forming the network of tissue whose primary function is mechanical. The very young basidiocarp is surrounded by a loose weft of hyphae considered the primary volva. After the formation of the peridium this tissue gives rise to the warts and the scales of the latter.—L. Dosdall.

species of the Saprolegniaceae parasitic to fish. Jour. Elisha Mitchell Sci. Soc. 55(1): 134-151. 1939.—128 strains of Saprolegniaceae were isolated in southern New England from living diseased aquatic animals: 122 Saprolegnia parasitica, 2 S. ferax, 2 Achlya flagellata, 1 sterile Achlya sp. and 1 sterile Dictyuchus sp. Representative strains were obtained in pure culture and their pathogenicity was verified by controlled inoculations. Strains of S. parasitica were compared with a subculture of Coker's type culture. Intensive study showed that the variations displayed in vegetative and asexual reproductive structures should serve only to extend the range of variation possible within the species. S. parasitica var. kochhari is considered to have been established on an inadequate basis. The renewal of zoosporangia by

cymose branching was found to be a more variable and therefore less significant character than has been thought, consequently the writer prefers not to accept the transfer of Saprolegnia parasitica to the genus Isoachlya.—W. N. Triffney.

15468. TYLER, L. J. Variation in Sphacelotheca sorghi (Link) Clinton. Minnesota Agric. Exp. Sta. Tech. Bull. 133. 1-48. 10 fig. 1938.—Germinating chlamydospores of the covered smut fungus of sorghums are described and illustrated. The associated cytological phenomena indicate a far greater variability and more deviation from normal type than hitherto supposed. Essentially, the life cycle was like that of several spp. of *Usulago*. Using sporidial fusions and the Bauch test for determining sex in S. sorghi, evidence was obtained that the sexual compatibility of paired lines may be determined soon after inoculation. Segregation for sex factors was apparently complete in the 1st or 2d nuclear divisions of the germinating spore. Two sex groups were found, and the sex factors segregated in the 2:2 and 1:3 ratios. Some data indicated that there are more than 2 sexual compatibility groups. 4 ratios of factor segregation for cultural characters (independent of segregation for sex characters) were found, viz., 2:2, 4:0, 3:1, and 2:1:1. Artificially cultured, S. sorghi comprises an indefinite number of cultural types differing in one or more cultural characters, which are discussed in detail. Nutrients appeared to affect the rate of sectoring, malt agar and plain sugar media plus nutrient salts appearing to induce sectoring. Some lines sectored abundantly, others only rarely. For more than a year 14 lines remained culturally constant when grown on potato-dextrose agar, but 8 of them produced one or more sectors of new cultural type when later grown on malt agar. Lines arising through intraspecific hybridization between monosporidial lines from different chlamydospores differed in pathogenicity as indicated by stunting, color of peridia, size and hardness of smut balls, size of chlamydo-spores, and length of time required for chlamydospore germination. A bibliography of 47 entries is included.—Courtesy Exp. Sta. Rec.

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GYMNOSPERMAE

15484. COVAS, GUILLERMO. Las coniferas indigenas de la Republica Argentina. [The indigenous conifers of Argentina.] Rev. Argentina Agron. 6(1): 17-34. 1 fig. 1939. -Argentina is not rich in spp. of the Coniferae, and some of the indigenous spp. extend into the forests of Brazil and Chile. Keys to the families, sub-families, genera, sub-genera and spp. are given. The following are recognized as indigenous in Argentina:—Podocarpaceae—Saxegothaea conspicua, Dacrydium fonckii, Podocarpus andinus, P. nubigenus, P. parlatorei; Araucariaceae—Araucaria araucana, A. angustifolia; Cupressaceae-Fitzroya cupressoides, Libocedrus chilensis, Pilgerodendron uviferum. Full botanical descriptions of these genera and spp. follow under common name, geographic distribution, observations and location of herbarium material. A bibliography of 38 titles is appended.—J. W. Gilmore.

15485. SCHWARZ, O. Über die Systematik und Nomenklatur der europäischen Schwarzkiefern. Notizbl. Bot. Gart.

u. Mus. Berlin-Dahlem 13(117): 226-243. 1936.—There is given a detailed discussion of the "Schwarzkiefer," its nomenclature, leaf anatomy, and distribution. The oldest and valid name is *Pinus maritima* Mill. (1768). It occurs in several isolated areas from Spain to Asia Minor. Minor differences are recognized between the species populations of these areas, and for them 6 subspp. are accepted, all being new combinations.—H. St. John.

SPERMATOPHYTA (MIXED)

15486. REHDER, ALFRED. New species, varieties and combinations from the collections of the Arnold Arboretum. Jour. Arnold Arboretum 20(1): 85-101. 1939.—New combinations are published and new varieties, forms and hybrids described in Abies, Picea, Taxodium, Thuja, Ulmus, Clematis, Magnolia, Lindera, Hydrangea, Liquidambar, Spiraea, Cotoneaster, Sorbus, Sorbaronia, Photinia, Malus, Pyrus, Potentilla, Rosa and Prunus.—A. Rehder.

MONOCOTYLEDONES

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15487. BURRET, M. Palmae gerontogeae. V. Notizbl.

Bot. Gart. u. Mus. Berlin-Dahlem 13(117): 185-200. 1936.—

New spp. of palms from the Old World in Pinanga and Areca, new combs. in Areca from Pinanga, and the new genus PSEUDOPINANGA, related to Pinanga, from British N. Borneo with 8 new spp., 5 new vars., and 6 new combs. from Pinanga.—H. St. John.

15488. BURRET, M. Die Palmengattung Gronophyllum Scheff. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 13 (117): 200-205. 1936.—Synopsis of the genus Gronophyllum (Palmae) with 2 new spp. from the Celebes; also a new comb. in Leptophoenix.—H. St. John.

15489. FOSBERG, F. R. Notes on Polynesian grasses. Bernice P. Bishop Mus. Occas. Papers 15(3): 37-48. 3 fig. 1939.—Discusses relationship of species of Eragrostis on

1939—Discusses relationship of species of Eragrostis on central Pacific islands and describes E. whitneyi * and its var. caumii *, especially emphasizing fruit differences. Gives comparisons and distribution of species of Digitaria, sect. Solitaria; and note on Paspalum vaginatum.—E. H. Bryan.

15490. WHITNEY, L. D., E. Y. HOSAKA, and J. C. RIPPERTON. Grasses of the Hawaiian ranges. Hawaii Agric. Exp. Sta. Bull. 82. 1-148. 80 fig. 1939.—Describes and figures 103 spp. of grasses of most importance in Hawaii, with record of origin and island distribution. Also lists 239 spp. found in Hawaii, with scientific and common names, country where native, and date of introduction; 54 spp. are glossary of botanical terms, and an index are given -E. Y. Hosaka.

DICOTYLEDONES

15491. ALEXANDER, EDWARD J. Clematis texensis.

15491. ALEXANDER, EDWARD J. Clematis texensis. Addisonia 21(1): 5-6. 1 pl. 1939.
15492. ALEXANDER, EDWARD J. Cooperia smallii n. sp. Addisonia 21(1): 7-8. 1 pl. 1939.
15493. ALEXANDER, EDWARD J. Lonicera canadensis. Addisonia 21(1): 9. 1 pl. 1939.
15494. ALEXANDER, EDWARD J. Chrysopsis hyssopifolia. Addisonia 21(1): 11-12. 1 pl. 1939.

15495. ALEXANDER, EDWARD J. Campanula divaricata. Addisonia 21(1): 13-14. 1 pl. 1939.
15496. ALEXANDER, EDWARD J. Strophanthus preussii. Addisonia 21(1): 15-16. 1 pl. 1939.

15497. BARKLEY, FRED A., and MERTON J. REED. Actinocheita. Amer. Midland Nat. 21(2): 368-377. 5 pl., 1 fig. 1939.—A reexamination of the question as to the identity of Rhus filicina DC. is made with the conclusion it is conspecific with R. potentillaefolia Turez. The data concerning the genus Actinocheita, to which this species belongs, are reviewed.—F. A. Barkley.
15498. BURRET, M. Beiträge zur Kenntnis der Tiliaceae.

Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 13(117): 252-255. 1936.—New species or combinations from Malaysia in the genera Brownlowia, Grewia, and Trichospermum.— H. St. John.

15499. CAMP, W. H. Hugeria erythrocarpa. Addisonia 21(1): 3-4. 1 pl. 1939.
15500. DOMKE, W. Compositae novae andinae. I. Compositae novae andinae. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 13(117): 244-251. 1936.—New species or varieties of Compositae from the Andes of South America are described in Erigeron, Dysodia, Senecio, Chaptalia, Onoseris, Perezia, and Hypochoeris.— H. St. John.

15501. EVERETT, T. H. Leucocoryne ixioides. Addisonia

21(1): 1-2. 1 pl. 1939.

15502. FOSBERG, F. RAYMOND. Taxonomy of the Hawaiian genus Broussaisia. (Saxifragaceae). Bernice P. Bishop Mus. Occas. Papers 15(4): 49-60. 1939.—Reviews history and taxonomy of the genus, and gives key to and descriptions of 2 vars. and 5 forms, the latter described as new. All are endemic to the Hawaiian Islands.-E. H.

15503. KNOBLAUCH, E. Neue afrikanische Jasminum-Arten. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 13(117): 256-257. 1936.—Three new species or combinations in Jas-

minum from Africa.-H. St. John.

15504. LOESENER, TH. Celastraceae novae vel melius cognoscendae. II. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 13(117): 215-226. 1936.—New spp. described in Celastrus, Maytenus. New spp. or combs. made in Lophopetalum, Myginda, and ten in Solenospermum; and new varieties in Maytenus and Gymnosporia. The Lophopetaleae, a new tribe, is described for Lophopetalum, Solenospermum, Peripterygia, and Kokoona.-H. St. John.

15505. MERRILL, ELMER D. New Sumatran plants. IV. Papers Michigan Acad. Sci., Arts and Lett. 24(1): 63-92. 1938(1939).—55 spp. originally described from extra-Sumatran material are herein recorded from Sumatra for the first time, and 18 spp. are described as new in Laportea, Helicia, Cyclea, Drepananthus, Fissistigma, Horsfieldia, Rhynchosia, Evodia, Cleistanthus, Meliosma, Microcos, Melastoma, Blastus, Anplectrum, Tabernaemontana, Alyxia, and Ainsliaea. New names appear in Artocarpus, Sphaerostylis, and Medinilla.—E. D. Merrill.

15506. PILGER, R. Eine neue Amoreuxia aus Peru. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 13(117): 255. 1936.—One new member of the Bixaceae from Peru in the

genus Amoreuxia.-H. St. John.

15507. SLEUMER, HERMANN. Ericaceae americanae novae vel minus cognitae. III. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 13(117): 206-214. 1936.—One new species and five new combinations in Gaultheria on transfers from Pernettya; one new combination in Pernettya; a synopsis of the genus Leucothoe with a definition of six sections, one new species, one new combination from Eubotrys; and one new species of Pelleginia.—H. St. John.

15508. SLEUMER, H. Die von S. F. Kajewski auf den Salomons-Inseln gesammelten Oleaceen. Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem 13(117): 258-259. 1936.—Locality

records and one new species of Linociera from the Solomon

Islands.—H. St. John.

15509. SULIT, MAMERTO D. The genus Mussaenda in the Makiling National Park. Philippine Jour. Forest. 2(1): 35-43. 3 col. pl. 1939.—M. anisophylla, M. albiflora, M. luteola, M. philippica, and M. philippica v. aurorae are descr. and illus.—W. N. Sparhawk.

15510. WALKER, EGBERT H. Concerning Ardisia crispa (Thunb.) A. DC. and A. crenata Sims, confused species of Myrsinaceae from eastern Asia. Jour. Washington Acad. Sci. 29(6): 256-261. 2 fig. 1939.—The error made by A. DeCandolle in 1836 in placing A. crenata Sims as a synonym of A. crispa has caused the most commonly cultivated Ardisia usually to bear the latter name. Recent studies prove these to be distinct species. Hence, A. crenata Sims must be restored and the name A. crispa (Thunb.) A. DC. must be used in its original sense, with A. henryi Hemsl. and A. hortorum Maxim. as synonyms. Both spp. are described and 2 new vars. of A. crispa, both from China, are proposed.—E. H. Walker.

FLORISTICS AND PLANT DISTRIBUTION

15511. CORTI, ROBERTO. Le raccolte botaniche nel Sud Cirenaico del Prof. L. Di Caporiacco (1913-Spediz. Marchesi) e del Prof. U. Monterin (1934-R. Soc. Geogr. Italiana) e la florula delle Oasi di Cufra e del Gebél Auenát. [Botanical collections in South Cyrenaica, and the flora of the oases of Cufra and Gebél Auenát.] Nuovo Gior. Bot. Ital. 45(1): CCII-CCXL. 3 fig. 1938(1939).—A report upon 58 specimens collected in northeast and southeast Libya. The list adds 18 species to the previously known 26 spp. of spermatophytes of the desert area of southeast Libya. Diceratella saharina (Brassicaceae) is described (p.CCXIII), and Hyoscyamus muticus subsp. brevibractetus (p.CCXIX). The chief geographical element of the flora is eastern, over 90% of the spp. occurring also in Egypt. The biological spectrum in per cents is: Phanerophytes 25, Chamaephytes 25, Hemicryptophytes 21, Cryptophytes 27, Therophytes 2. A list of 28 cultivated spp. in the Oasis of Cufra is given, including sugar cane, wheat, barley, date, onion, lemon, orange, cotton,

olive, tomato, egg-plant, and melons.—F. Ramaley. 15512. FAWCETT, ROSAMOND A. Flora of Riverside and vicinity. Western Riverside county, to the east edge of the Coachella Valley, and a contiguous portion of San Bernardino county to the north foot of the San Bernardino mountains. Riverside Junior Coll. Occas. Papers 9(1): 1-172. 1939.—A popular flora. The grasses are omitted.

15513. FIORI, ADRIANO. Piante raccolte nelle Isole

Italiana dell' Egeo; secondo contributo. [Plants collected on the Italian Aegean Islands, second list.] Nuovo Gior. Bot. Ital. 45(1): CXXXII-CXXXVIII. 1938(1939).—Lists of plants adding 18 spp. to the known flora of the island of Rodi, 22 to the island of Lero, 3 to Stampalia, and 1 to Calino.-F. Ramaley

15514. GEORGESCU, C. C., și CONST. D. IONESCU-BÂRLAD. Răspândirea laricelui și zâmbrului in bazinul superior al Ialomitei. [Natural distribution of larch and Pinus cembra in the upper Ialomitza basin (Rumania).] Rev. Pădurilor [Bucharest] 51(2): 150-154. Map, 3 fig. 1939.

15515. PREDESCU, GH. Pinul silvestru în basinele pâraielor "Bratul-Incet" si "Apa-Rosie" din Munții Oituzului. [Pinus silvestris in the Oituz Mts.] Rev. Pădurilor [Bucharest] 51(6): 514-520. 5 fig. 1939.—Distrib. of P. silvestris in the eastern Carpathians.

15516. SBURLAN, D. A. Pinul silvestru de la Pralea. [Pinus silvestris in the Pralea region (Rumania).] Rev. Pădurilor [Bucharest] 51(6): 506-513. 2 fig. 1939.—A natural station of P. silvestris in the Moldavian hills is descr.

MORPHOLOGY AND ANATOMY OF VASCULAR PLANTS

ADRIANCE S. FOSTER, Editor

(See also in this issue Entries 15431, 15561, 15630, 15634, 15765, 15817)

15517. ABBE, LUCY B., and A. S. CRAFTS. Phloem of white pine and other coniferous species. Bot. Gaz. 100(4): 695-722. 47 fig. 1939.—In *Pinus strobus* cambial division may start as early as Feb. and it is rapid during May. Phloem differentiation may lag until late summer or early fall, and daughter cells may remain in various stages of maturity through the winter. Sieve-tube differentiation starts with localization of the nucleus in a protoplasmic bridge in the center of the cell. Turgor expansion bulges the pit areas and enlarges the cell. Protoplasmic streaming and vital stain accumulation occur. As the sieve tube matures, the nucleus disintegrates, the cytoplasm ceases streaming, becomes fibroid, stains heavily, and assumes a parietal position. The cell walls thicken and secondary walls form. Vital stains no longer accumulate and the cells fail to plasmolyse. These changes indicate a lowering cell activity and an increasing permeability. Callus forms around the denatured protoplasm of the sieve-tube plasmodesmata. Starch grains are released from the plastids to float free in the vacuoles. With senility the callus increases, the cytoplasm becomes thin and ceases to stain; starch grains are reduced in numbers. Death of the sieve tube results in loss of the cytoplasm, callus, and starch. Air invades the lumen and the element finally collapses. Other genera of conifers have phloem fibers; secondary wall thickening is confined to these elements which are commonly lignified. Plasmodesmata of white pine are slender, solid, and fibroid in structure during the functioning period of the sieve tubes. Those of redwood are even more slender consisting of anastomosing strands.—A. S. Crafts.

15518. COOPER, D. C. Development of megagameto-

phyte in Erythronium albidum. Bot. Gaz. 100(4): 862-867. 16 fig. 1939.—The primary archesporial cell functions as the macrospore mother cell which develops directly into the megagametophyte. In consequence of the 2 meiotic divisions The chromosome number is n=22, 2n=44.—D. C. Cooper. 15519. ERICKSON, HARVEY D. The flow of liquid through radial resin canals. Jour. Forest. 36(4): 417-423. 2 fig. 1938.—Water forced through tangential sections of various softwoods, 1.25 mm. thick, permeated most rapidly those sections in which radial resin canals were unblocked. The rate of flow and number of visibly effective canals varied with spp. and with different sections of the same sp. Several methods of detecting the flow of water through

wood sections are described—A. G. Hall.
15520. HEWITT, W. C. Seed development of Lobelia amoena. Jour. Elisha Mitchell Sci. Soc. 55(1): 63-82. 4 pl. 1939.—The tube nucleus usually entirely disappears before the pollen tube begins to germinate. The 2-nucleate embryo sac breaks through the single layer of nucellus, and the inner layer of the integument functions as a "tapetum." A normal-type embryo sac is formed, but the antipodals disappear before double fertilization occurs. Two cells at each end of the 8-celled endosperm develop into large micropylar and chalazal haustoria; the remaining 4 cells develop into the large central mass of endosperm. There is an embryonal haustorium within the micropylar endo-sperm haustorium. The 1st division of the zygote is transverse, forming a primary embryonal cell, all the derivatives of which develop into parts of the embryo, and a primary, suspensor cell, all the derivatives of which develop into parts of the long suspensor. The first 3 transverse divisions of the embryonal cell can be traced in the development to the mature embryo, and the first anticlinal divisions in the distal tier separate the future cotyledons from the future plumule. The mature seed contains a great deal of endosperm, a small embryo, and a seed coat consisting of scarcely more than a single layer of cells.-W. C. Hewitt.

15521. JOSHI, A. C. Some abnormal flowers of Argemone mexicana and their bearing on the morphology of the gynoecium of Papaveraceae. Ann. Botany 3(10): 503-505. 4 fig. 1939.—Flowers of A. mexicana are described in which the gynoecium has been transformed into a cup with lobed margin or into free leafy carpels. The number of lobes or leafy carpels in such gynoecia varied from 3 to 5; this agrees with the general view of systematists regarding the

number of carpels composing the gynoecium in this species, and is against the views of Saunders and Dickson.—Auth. summ.

15522. KAUSIK, S. B. Morphology of abnormal flowers in some angiosperms. New Phytol. 37(5): 396-408. 5 fig. 1938.—The abnormalities described fall into 2 general categories; virescence and phyllody of the floral organs (found in Tropaeolum majus, Trichosanthes anguina, and Allamanda grandiflora) and petalody of the stamens (found in Jasminum). A solitary case of an ovary abnormality in Utricularia coerulea was also found. The vascular anatomy of the abnormal flowers is briefly discussed. The abnormal features of flowers described here are regarded as reversions in which there is a reappearance of ancestral characters; but by such reversions to an ancestral condition, it is not suggested that the floral parts are in any sense metamorphosed foliar appendages.—J. R. King.

15523. MATHEWS, ANDREW CLARK. The morphological and cytological development of the sporophylls and seed of Juniperus virginiana L. Jour. Elisha Mitchell Sci. Soc. 55(1): 7-62. 9 pl. 1939.—The staminate cones begin development in August and reach maturity and bear mature pollen grains by winter prior to pollination the following spring. The mature peltate microsporophyll is formed by the evagination and downward development of a flattened and tapering secondary outgrowth of sterile tissue immediately distal to the group of 3 to 4 microsporangia. The mature pollen grains of late Sept. are uninucleate, wingless, and possess a rich supply of large starch grains whose complete development is clearly shown for the first time. This starch content is exhausted by the time of pollination. n=11. Pollination occurs about Feb. 15th. Internal cellulose bands of the microsporangial wall cells facilitate sporangial rupture. The mature microgametophyte consists of the tube nucleus and somewhat similar stalk cell nucleus in the tip of the tube, and 2 spherical and equal \mathcal{S} cells side by side immediately posterior to these nuclei. The \mathcal{S} cell cytoplast contains a large number of small starch grains. The ovulate cone begins to develop about the middle of Sept. prior to pollination. Three flower-types are newly described for J. virginiana. The megasporophyll consists of an abaxial coverscale and an adaxial fruit-scale, both of which possess a separate vascular supply. Ontogenetically, the fleshy megasporophyll of J. virginiana is homologous with that of the Abietineae and other conifers. A complete account of the development of the integumentary stony layer of the seed is given. The 2 divisions which give rise to megaspores result in the production of a triad of cells which usually are not in a straight row, and only the 2 lower cells of the triad bear haploid nuclei. Fertilization occurs between June 1st and 7th at Chapel Hill, North Carolina. Both & cells of a microgametophyte effect fertilization in separate archegonia. The starch-filled & cytoplast accompanies the of nucleus into the egg and completely enfolds the zygote nucleus and subsequently furnishes the only visible starch in the sporophytic cells of the young proembryo. In the 12-celled proembryo of J, virginiana all the 8 cells below the rosette tier elongate as prosuspensor cells. Apical embryo initials are cut off from the elongating suspensor emoryo initials are cut off from the elongating suspensor units after the whole proembryo has reached about ‡ of its ultimate length (i.e., approx. 0.6 mm.). The whole proembryo continues to elongate in a spiral fashion until it is about 2.75 mm. long. The proembryo system shows distinct cleavage polyembryony, but the most anteriorly developing embryonic cell group becomes largest and produces the final single embryo of the seed. The mature embryo is dicotyledonous and reaches maturity late in July embryo is dicotyledonous and reaches maturity late in July.

—A. C. Mathews.

15524. PUCCINI, GIULIANO. Un caso di duplicazione del culmo in Triticum vulgare Vill. [Duplication of the culm in T. vulgare.] Nuovo Gior. Bot. Ital. 45(1): LXIII-LXIV. 1 fig. 1938(1939).—A teratological branching of the stem at one of the nodes.—F. Ramaley.

ilio (18 de la 1907) Milio Radio (1907)

15525. TUKEY, H. B., and J. ORAN YOUNG. Histological study of the developing fruit of the sour cherry. Bot. Gaz, 100(4): 723-749. 6 fig. 1939.—This paper pictures and discusses the gross development of the fruit of the sour cherry (*Prunus cerasus* var. Montmorency) from 18 days before full bloom to fruit ripening, and the histological changes during the pre-bloom stage, stage I (rapid development for during the pre-bloom stage, stage I (rapid development for 20 days following full bloom), stage II (retarded development for 16 days), and stage III (rapid development for 21 days to fruit ripening). Three principal tissues compose the ovary wall; inner and outer epidermis, stony pericarp, and fleshy pericarp. The stony pericarp may be divided into an inner and an outer layer, and the fleshy pericarp into an innermost layer of small thin-walled parenchyma, a middle region of large thin-walled parenchyma. The fleshy and the stony pericarp are derived each from distinct groups of the stony pericarp are derived each from distinct groups of cells which are early separated from one another by characteristic size, shape, and frequency and periodicity of cell division. The inner layer of the stony pericarp is derived from the inner epidermis, together with a few adjacent cells of the pericarp, and forms a band or "hoop" of transversely elongated cells bounding the inner ovary wall. The outer layer is derived from the pericarp, and the cells of which it is composed are elongated at right angles to those of the inner layer. The cells of the stony pericarp increase in number during the pre-bloom stage and the first few days of stage I, and enlarge during the latter part of stage I. Cell walls become progressively thicker, and by the end of the period the maximum number and size of cells is attained. During stage II the walls thicken and harden greatly. During stage III there is slight increase in hardness and brittleness. The cells of the fleshy pericarp increase in number during the pre-bloom stage and the first half of stage II. In the last half of stage II they double in diameter. During stage II there is slight enlargement. During stage III the size of individual cells increases remarkably. Those in the outer portion of the fleshy pericarp become roundish-oval, outer portion of the fleshy pericarp become roundish-oval, with the greatest diam. parallel to the periphery of the fruit; those next inward become roundish; those next, obovate in a radial direction; next, radially elongate; and innermost, decidedly radially elongate. At maturity the largest cells indicate an increase of 25 times in diam. from the size at full bloom. The epidermal cells are elongated radially 18 days before full bloom. They increase rapidly in number during the pre-bloom stage and during the first half of stage I increase in size and wall thickness during half of stage I, increase in size and wall thickness during the later half of stage I, change but little during stage II, and greatly enlarge tangentially in stage III. The stomata are fully differentiated 18 days before full bloom. The guard cells increase in size as the fruit develops, but the increase is less than that of typical epidermal cells. The similarity of other fruits and the mechanism of enlargement in stage III are discussed.—H. B. Tukey.

15526. WEBER, H. Gramineen-Studien. II. Über Entwicklungsgeschichte und Symmetrie einiger Grasinfloreszenzen. Planta 29(3): 427-449. 22 fig. 1939.—The development of the primary inflorescence-branches is acropetal in all cases. In Vulpia, Brachypodium and others, however, there appears an early advancement in growth in the terminal portion of the young inflorescence; in such forms the development can be designated as acropetalous-acrotonous. Less often acropetalous-mesotonous (Alopecurus) and acropetalous-basitonous (Asperella) types were noted. During the expansion of the inflorescence, these ontogenetic differences tend to become equalized and the mature inflorescence often shows a weak promotion of its middle region. The terminal spikelet is the direct continuation of the main axis and is not a sympodially-developed lateral spikelet. With respect to lateral symmetry, the dorsiventral-acropetal inflorescence is regarded as the basic type. The development of the individual spikelets is acropetalous-basitonous

in all investigated cases.—A. S. Foster.

AGRONOMY

Editor: CARLETON R. BALL. Associate Editors: M. A. McCALL, Crops; R. B. DEEMER, Soils

(See also in this issue Entries 14356, 14357, 14362, 14363, 14380, 14383, 14989, 15092, 15096, 15101, 15405, 15406, 15526, 15594, 15607, 15621, 15622, 15697, 15700, 15726, 15742, 15764, 15771, 15772, 15784, 15787, 15789, 15791, 15792, 15836, 15867, 15873, 15876, 15881)

CROP SCIENCE (ARVICULTURE)

15527. ARCENEAUX, GEORGE, and I. E. STOKES. Studies of gaps in sugarcane rows and their effect upon yield under Louisiana conditions. $U.\ S.\ Dept.\ Agric.\ Circ.$ 521. 1-20. 1939.—Studies of extent of gaps occurring in rows of vars. of sugarcane grown commercially and of effect of gaps of varying lengths upon yields of sugar per acre from several important vars. as determined from controlled exptl. plots. Short gaps reduced yields much less than equivalent space in longer gaps. Actual losses in sugar yield per acre resulting from gaps were considerably less than losses estimated from the percentage of initial vacant space in the rows. Important losses may occur in the presently grown C. P. and Co. vars. in spite of the fact that, as a group, they show much lower percentages of gaps than ordinarily occurred in several P.O.J. vars. formerly grown. The formula Y'=Y/(1-GR) gives an estimate of loss of sugar per acre from gaps under specific conditions, Y being the observed yield under a given condition as to gaps, Y' the estimated yield with perfect stand, G the percentage of linear-row footage in gaps, and R the calculated yield-reduction factor applying under the conditions.— $S.\ F.\ Sherwood$.

footage in gaps, and R the calculated yield-reduction factor applying under the conditions.—S. F. Sherwood.

15528. BLAIR, A. W., A. L. PRINCE, and L. E. ENS-MINGER. Effect of applications of magnesium on crop yields and on the percentages of calcium and magnesium oxides in the plant material. Soil Sci. 48(1): 59-74. 1 pl. 1939.—A variety of vegetable crops, mixed hay, soybean hay, and corn forage were grown on several types of soil with and without Mg treatment. String beans and corn forage grown on Sassafras sand showed a definite response to the Mg treatment. The work gave little indication that the loam soils of North Jersey are deficient in Mg for the crops that are grown. Analysis of the plant material for CaO and MgO shows that when MgSO₄ is applied, the Mg content of the plant is commonly increased considerably. Frequently CaO in the plant tends to decrease as MgO increases. Where crops are to be analyzed for mineral constituents it is important to know the type of soil and the fertilizer and liming practices followed in growing the

rerop.—A. W. Blair.

15529. BLANCK, E., and R. THEMLITZ. [A further contribution concerning the fertilizing value of natural silicates and carbonates of lime and magnesia and also of silicic acid.] Jour. Landw. 86(3): 165-180. 1939.—Field trials with oats were conducted at 3 locations. As indicated by yields of dry matter, no superiority of the silicates over the oxides was demonstrated, both effectively increased yields. Igniting the natural silicates failed to appreciably change their effectiveness. In pot cultures with 2 soils (a Merzalben soil and an Oder sand) each having a basic fertilizer treatment, varying amounts of silica gel were incorporated. The data indicate only small increases in total dry matter resulting from the silica-gel treatments. The percentage of SiO₂ in the plants was consistently increased but the percentage of P was not appreciably influenced. Total silica removed in the plants was appreciably increased by all silica gel treatments on both soils but only the heavier applications on the Oder sand produced what appeared to be significant increases of total P removed in

appeared to be significant increases of total P removed in the plants.—W. H. Metzger.

15530. BLEDSOE, R. P. Cotton variety tests at eight locations in Georgia for 1938. Commercial Fertilizer 58(3): 20, 22. 1939.

15531. CIFERRI, RAFFAELE, e G. RENZO GIGLIOLI. Proposta di una "formula" per la caratterizzazione delle varietà e forme di frumento. [A proposed "formula" for the characterization of varieties and forms of wheat.] Nuovo Gior. Bot. Ital. 45(1): CLXXXIII-CLXXXIX. 1938(1939).—The authors propose the use of initial letters (of Italian names) for: beard, glume, fruit, etc.; for colors, as yellow, red, purple, and black; for surface of glumes and palets, glabrous or pubescent. Arabic figures are em-

ployed for length, frequency, presence, and absence of various structures. As an example, the "formula" for the variety Russello is 121. D52. DGO2. D221.—F. Ramaley.

15532. COLIN, H., et M. SIMON. Azote et organates dans la betterave suivant la source d'azote. Publ. Inst. Relies Amblior. Retterave 6(8), 450 463, 1038. 1038. Ingreseire.

15532. COLIN, H., et M. SIMON. Azote et organates dans la betterave suivant la source d'azote. Publ. Inst. Belge Amélior. Betterave 6(6): 459-463. 1938.—Increasing applications of NaNO₃ result in an increase in N content of beet root, and also increase in the amt. of ash and alkalinity of the soluble salts in the ash of the root. The proportion of basic carbonates to other bases varies slightly. —W. W. Robbins.

15533. COLLINS, E. R., and H. D. MORRIS. Progress report on fertility investigations with peanuts in 1938. North Carolina Agric. Exp. Sta. Agron. Inform. Circ. 117. 1-7. 5 fig. 1939.—In the first year of studies on 4 soil types in 5 fields in the peanut belt in eastern N. Carolina, peanuts responded in yield increases to gypsum only on 2 Dunbar-Lenoir fine sandy loams with respective pH values of 5.9-6.1 and 4.6-4.8, to lime only on the latter soil, to K alone only on Norfolk very fine sandy loam, to P on no soils with increased yield but with a decrease on Ruston loamy sand, and to K alone and to 300 lb. per acre of a 2-8-4 fertilizer only on the Norfolk soil.—Courtesy Exp. Sta. Rec.

15534. CRAMPTON, E. W. Pasture studies. XIV. The nutritive value of pasture herbage. Sci. Agric. 19(6): 345-357. 1939.—This paper is chiefly critical discussion of the methods commonly employed in estimating the nutritive value of pasture herbage. The limitations of certain fractions of the standard feedingstuffs analysis as satisfactory criteria of feeding value are especially emphasized and illustrated by results obtained from rabbit feeding trials at Macdonald College as well as by data published in the literature. The usual feedingstuffs analysis (chemical) does not partition the organic material of a feed into biological units, and hence their value in predicting feeding value is necessarily uncertain. As a possible improvement in this respect in so far as pasture herbage is concerned a modification in the analytical plan is proposed whereby the "carbohydrate" fraction is to be separated into (1) lignin, (2) cellulose and (3) other carbohydrate instead of the present groups—crude fiber and N-free extract. Data are presented indicating that lignification of the herbage increases from spring herbage to mid-summer and then decreases as cooler seasonal conditions re-occur; and that the nutritive value of the herbage is negatively correlated with the lignin trend. The need for "pilot" animals in studying the nutritive value of pasture herbage is stressed and the possibilities of rabbits for this purpose discussed.—E. W. Crampton.

15535. DELWICHE, E. J., F. L. MUSBACH, W. B. SARLES, EMIL TRUOG, J. C. WALKER, and H. F. WILSON. Canning peas in Wisconsin. Wisconsin Agric. Exp. Sta. Bull. 444. 1-24. 1939.—Comparatively cool weather and an abundance of moisture favor the growth of canning peas. Well-drained, fertile loams and clays are best for this crop, which matures in 60 to 70 days. Peas should not be grown on a field more than once in 4 yrs., but fit well into rotations in which they follow either a cultivated crop or legume hay. Inoculation of the seed with a good culture of root-nodule bacteria increases yields, improves quality and conserves soil N. Early seeding gives highest yields. Depth of seeding must be varied according to type of soil, organic matter content, water content and temp. of soil. Work on rate of seeding is still in progress, but results show heavier rates (3-4 bushels per acre for Alaska to 5 for large-seeded Horsford vars.) give best yields. Acid soils should be limed before being planted to peas. From 175 to 225 pounds per acre of fertilizer drilled in the rows at planting gives best results. Fertilizer elements most commonly needed are P and K. Nicotine vapor and rotenone dusts, when properly applied, are effective in controlling pea aphids. These insecticides should be applied between the time when the

first flower buds appear to the beginning of pod formation. Rotenone dusts are most effective in the presence of moisture, and at temps. above 70° F. Common wilt, near-wilt and root-rot are the most important diseases of peas in Wisconsin. Near-wilt resistant vars. are being developed; vars. resistant to common wilt are available. Root-rot is not under control and is troublesome in rainy seasons and on wet soils. Seed treatment with Ceresan or red copper oxide is not recommended unless seed rotting is common. Large-berried vars. of mid-season maturity give best yields of high-quality peas. Pea-breeding work is in progress to secure better vars.—W. B. Sarles.

15536. DUNGAN, G. H., A. L. LANG, J. H. BIGGER, B. KOEHLER, and O. BOLIN. Illinois corn performance

tests, 1938. Illinois Agric. Exp. Sta. Bull. 450. 225-272. 5 fig. 1939.—The 246 kinds of corn compared on 10 fields in 1938 included 219 hybrids and 27 open-pollinated wars. The number of entries in each field was limited to 60, which included 5 adapted open-pollinated vars. selected to serve as a check. The 5 best hybrids on all 10 fields surpassed the best 5 open-pollinated vars. by an average of 15.5 bu. per acre and by 13.2 in percentage of erect plants. The 5 hybrids excelled in 9 fields in yield of sound corn and on all fields in percentages of erect plants. In the 2 northern and I central sections even the 5 poorest hybrids on the average outyielded the 5 open-pollinated corns. Two- and 3-yr. summaries of results in several northern and central sections show that certain hybrids were definitely superior to adapted open-pollinated vars., but the advantage was small or nil in the more southern sections. Dropped ears were appreciable only in 2 fields, at Reddick 0.92% and Littleton 0.55%; 15 hybrids in the Reddick field and 10 hybrids in the Littleton field dropped 1% or more of their ears. Many hybrids were above average in resistance to 2 spp. of corn rootworms, the only insects causing note-worthy damage on the 1938 fields. A combination of Stewart's disease and Diplodia stalk rot reduced yields as much as 50% in some localities in 1938, most severely in south-central Illinois. With exceptions, the high-yielding hybrids appeared to be more susceptible to the above disease complex than lower-yielding hybrids. Disease susceptibility seemed to be correlated most highly with earliness of maturity. Soil adaptation tests in 1938 continued to demonstrate the need for fertile soil to take full advantage of the high productiveness of good hybrids. However, yield alone is not always a complete index to the adaptability of a var. or hybrid to a given soil, for lodging, type of ear, and kernel formation may also be influenced greatly by

productivity level.—Courtesy Exp. Sta. Rec. 15537. FEHER, D., und H. V. PALITSCHEK. Untersuchungen über den Wasserhaushalt des Kulturbodens und der Rulturpflanzen. Landw. Jahrb. 87(6): 721-773. 1939.—Cultivated plants possess a so-called optimum soil moisture range for optimum growth. The opt. soil moisture content is about 63% of the water-holding capacity for peas, 70-72% for wheat and barley, and 80% for beets. Greenhouse expts. agreed with those of the field and may be used for the control of artificial watering. The biol. status of the soil including not only microbial numbers but also microbial respiration is of vital importance to conditions favorable for plant growth.—I. C. Feustel.

15538. FRANKEL, O. H. Analytical yield investigations on New Zealand wheat. IV. Blending varieties of wheat. Jour. Agric. Sci. 29(2): 249-261. 2 fig. 1939.—A description of expts. to test the value of sowing several vars. of wheat in a blend as a means of stabilizing yields under unavoidable environmental variations. In the study reported an attempt was made to find high quality lines which, when blended with the standard variety Tuscan, would return a composite with the standard variety Tuscan, would return a composite yield at least as high as that of the standard and have superior baking quality. The 3 lines included in trials were closely similar to Tuscan in morphological characters in development and yield. Plants of pure vars. and of the same vars. grown in blends of varying proportions were submitted to analysis of yield characters, viz., yield per clant, number of heads per plant, yield per ear, number of grains per ear and wt. of 100 grains. Field trials were sarried out in 1935-6, 1936-7. Results of the 11 lines which were blended with Tuscan, 9 blends returned yields corresponding to expectation, calculated from the pure vars and ponding to expectation, calculated from the pure vars., and

2 blends yielded slightly more, while the yields per plot of blends corresponded to expectation; the yield analysis revealed that the component vars. exerted a modifying influence on each other, which was different in each of the 3 trials. Tuscan depressed in every case the yield characters of the lines with which it was blended.— $T.\ D.\ Jarvis.$

of the lines with which it was blended.—T. D. Jarvis.

15539. GABRICHIDZE, N. M. Ferment katalaza kak pokazatel' kachestva prosushennoi pshenitsy. [Catalase as an indicator of the quality of dried wheat.] [In Russ. with Eng. summ.] Biokhimitā 3(6): 813-820. 1938.—When grain containing 13.1-27.8% moisture is heated to 52° (temp. of heating chamber, 70°), the initial effect is an increase in catalase activity. This temp. can be maintained for 90 min. The chamber temp. can be increased to 80° and, in case of grain of lower moisture content to 90° if the heating of grain of lower moisture content, to 90° if the heating time is reduced. Catalase activity may serve to indicate the physiological condition of grain, which is important in determining drying methods and in the construction of drying apparatus.—E. Johnston.

15540. GARNER, F. H., and H. G. SANDERS. Experiments on the spacing of sugar beet. I. Results based on plot yields. II. Results based on weights of individual plants. Jour. Agric. Sci. 29(1): 48-68. 4 fig. 1939.—Expts. were conducted in 1934 and 1936 on Cambridge Univ. farm to study effect of gaps under varying spacing conditions. This paper describes expts. and first statistical analyses which have been performed.—I. Yields of roots and of sugar, and wt. of tops, increased as row distances decreased, up to 18 inches. In rows less than 18 in., the increase was too slight to be economical. Spacing in row from 6 to 12 inches did not affect the yields of root and sugar. Twelve-inch spacing proved most desirable because of convenience in working. The expts. threw no light on question of relainch spacing proved most desirable because of convenients in working. The expts. threw no light on question of relationship between optimum spacing and field fertility.—II. Yields of plots estimated from weights of "perfect" beet showed 18 inches by 9 inches to be optimum spacing. Sugar analysis of individual, perfect beet showed very diminutive roots low in sugar, but in general, sugar percentage decreased slightly with increasing weight of root. In dry years, roots immediately surrounding a gap compensated for 80%-89% of the missing plant: in wet years, compensation varied from the missing plant; in wet years, compensation varied from 41%-84% under various spacing treatments; in both years, compensation was less complete in tops than in roots. Under similar spacing treatment, considerable variation remained due to soil and genetic heterogeneity. Because of genetic variability of commercial seed, 400 plants were necessary to reduce plot error from this source to 2%.—T. D. Jarvis.

15541. GARNER, F. H., and H. G. SANDERS. Four-year leys—the inclusion of red clover: First year management, Jour. Agric. Sci. 29(1): 164-173. 1939.—Two expts. were carried out on the Cambridge Univ. farm to test the desirability of including late-flowering red clover in the seeds mixture in the case of a 4-year ley and to compare grazing with cutting for hay in the first harvest year. The majority of red clover survived for the first 2 years during which it increased yield of dry matter very markedly. It did not lead to any reduction of yield in the last 2 years. Red clover reduced encroachment of weeds and reduced proportion of wild white clover in later years but not seriously. Where the young plants were well established at the time and normal weather conditions were experienced, grazing was preferable to cutting for hay during the first harvest year. Where plants were slow in establishing themselves and in a superlatively dry spring and summer grazing checked the development of the sward too much and cutting for heaveness the sward too much and cutting for hay gave much better results.—T. D. Jarvis.

15542. GARNER, W. W. Some aspects of the physiology and nutrition of tobacco. Jour. Amer. Soc. Agron. 31(5): 459-471. 1939.—In connection with extensive cooperative fertilizer expts. with tobacco on light sandy and loam soils, occurrence of Mg deficiency in these soils, as evidenced by characteristic deficiency symptoms in the crop grown on them, was discovered at Oxford, North Carolina in 1923. Chem. analysis of these light soils and of the tobacco grown on them, and results of field plot tests, indicate that they are as likely to be deficient in Ca, Mg and S as in N, P and K. In specific cases soil deficiency in each of these 6 elements was demonstrated by (1) marked depression in crop yield, (2) occurrence in the crop of characteristic deficiency symptoms, (3) abnormally low content in the crop of the

particular element omitted from the fertilizer. These soils are properly to be regarded as somewhat impure sand culture media and it is not logical to apply to them salts or other substances containing 2 or more essential elements and attempt, without compensating treatment, to interpret the results in terms of only one of the constituent elements. Properly selected soils of this type are suitable for conducting "field sand cultures" and have been successfully employed for detailed physiol. study of effect of the N supply on growth, development and internal relations in the tobacco crop and on the chem. and physical properties of the cured leaf.—W. W. Garner.

15543. GEDDES, W. F., C. A. WINKLER, and JESSIE ROBERTS. The influence of nitrogenous, phosphatic and potassic fertilizers on the chemical composition and blending value of western Canadian wheat. Sci. Agric. 19(6): 380-388. 1939.—Reward wheat was grown in plots on a large number of farms in 9 agricultural districts of Manitoba in 1929, 1930 and 1931 in which nitrogenous, phosphatic and potassic fertilizers, both singly and combined, were drilled in with the seed at rates corresponding to 22.5 lb. N. 33 lb. Pa05 and 24 lb. K20 per acre. N applied as (NH4) \$0.4 for all treatments containing this element increased the wheat protein by 0.30% and 0.25% protein in 1929 and 1930 respectively. P resulted in decrease of 0.16% and 0.14% of wheat protein in 1930 and 1931 while K was without effect in any year. N applied as NaNO3 gave lower mean wheat protein values than (NH4) \$0.4 by 0.28% and 0.14% in 1929 and 1931. Wheat ash determined only in 1929 and 1930 was reduced in 1930 by 0.07% and 0.03% and nil as a result of N, P and K fertilization. P content of the wheat and the blending strength of the flour milled therefrom was unaffected. The increased yields obtained on the Canadian prairies by drilling in soluble nitrogenous and phosphatic fertilizers with the seed are due to a seasonal deficiency in available nutrients at the time of germination and are not obtained at the expense of quality.—W. F. Geddes.

15544. GLIEMEROTH, G. [The influence of straw and of peat on the fertilizer value of manure.] Jour. Landw. 86(3): 234-247. 1939.—Expts. are reported in which straw, peat and a mixture of the 2 were used as absorbents in manure. By analyses the peat, and peat and straw mixtures, were superior to the straw in absorbing and retaining nutrients. In 2 expts. in which potatoes were used as the test crop the manure containing peat and that containing peat and straw gave similar yields with perhaps a slight advantage for the manure containing peat only. Both were superior to the straw manure.—W. H. Metzger.

15545. GOSS, W. L., and EDGAR BROWN. Buried red rice seed. Jour. Amer. Soc. Agron. 31(7): 633-637. 1939.—
Under dry storage at soil temp. conditions existing in California, all of the red rices tested showed good vitality after 3 winters. The cultivated rices showed loss of vitality in the 3d year, especially the Caloro var. Cultivated white rice when buried in the soil at the depth of ordinary plowing loses its vitality during the first winter. Italian and California red rices behave very similarly to cultivated rices although they are slightly more persistent. In general, the seed remained alive longer in the irrigated than in the non-irrigated plots. The Italian purple-awned red var. retains its vitality longer than the California white-awned, particularly under dry conditions. The southern red rices show good vitality after 3 years in the soil and some germination after 7 years. They appear to persist longer under Texas and Arkansas conditions than under California conditions. Clean

rice.—E. Brown.

15546. HALL, T. D., and D. MEREDITH. Exotic pastures in the George-Knysna area: A study of fertility, milk production and management problems on kikuyu and other introduced grasses. S. African Jour. Sci. 35: 213-230. 1 fig. 1939.—Two seed mixtures were compared with a mixture of kikuyu and Kentucky blue grasses and clovers with different fertilizer treatments under rotational grazing. The best response was obtained from N dressings, and all N treatments gave increases of 78% to 111% over the "no fertilizer" treatment in terms of grazing days. Milk records from three rotations showed marked increases in returns per morgen and also increases in yields per cow. On the basis of 5 years' results it is concluded that this is potentially a good pasture

culture during a short rotation will not rid the land of red

area, and several of the spp. tried such as Dactylis glomerata, Paspalum dilatatum, Holcus lanatus, Trijolium repens and Poa pratensis have shown persistence and palatability.—Authors.

15547. HARLAN, J. D. A trial of new varieties of hops for New York. Bull. New York State [Geneva] Agric. Exp. Sta. 687. 1-8. 1939.—This report deals with the performance of certain hop vars. as grown in the vicinity of Waterville, N. Y., during 1938. The report covers certain of the older vars. and also some newly named seedling vars. Something of the origin of the vars. is included and also their performance in the exptl. hop yard, together with data on the percentages of soft resins present in samples. The new vars. Brewer's Gold and Bullion are promising and the former yielded much higher than any other var. Both vars. contained greater percentages of soft resins than any of the standard American sorts. Other than the great difference in yields there seems to be no material difference between the hops produced on roots obtained from the West Coast states and those produced on the native New York hops that have been selected for good healthy growth. The New York roots have not produced as well as the roots coming from the West.—J. D. Harlan.

15548. HAY, W. D. Identification of standard and fairway strains of crested wheatgrass. Jour. Amer. Soc. Agron. 31(7): 620-624. 2 fig. 1939.—Studies of the comparative morphology of the Standard and Fairway strains of Agropyron cristatum were made during 3 years on 500 seed samples, 100 seedling plants and 80 registered fields in Montana. Standard seeds were larger and heavier, and had fewer awns, and also differed from Fairway seeds in shape. In the seedling stage, 100% of the Fairway plants and 24% of Standard plants had fine hairs on the upper leaf surface. Seedling Fairway plants had more auricles and fewer leaf sheath spines than Standard plants. Field plantings of the 2 strains were most easily distinguished just before blooming. At that stage of growth differences in size and shape of spikes, and variations in height, color and number of stems per plant were most pronounced in the Standard strain.—W. D. Hay.

15549. HEY, G. B., and W. F. F. KEONSLEY. Experiments on the spacing of sugar beet. III. Further statistical considerations. Jour. Agric. Sci. 29(1): 69-75. 1939.—Continuation of statistical considerations based on expts. in beet spacing conducted on Cambridge Univ. Farm in 1934-36. The distribution of the total weight of beet in small areas, 2×1 yard, was examined and estimates made of the effects of missing beets on final yield, and of the yield to be obtained with various percentage plants. Distribution of gaps over field is found to be non-random. The percentage of gaps varies from block to block, but does not differ greatly between the spacings. Three methods were employed and gave consistent results.—T. D. Jarvis.

15550. HIDE, J. C., and W. H. METZGER. The effect of cultivation and erosion on the nitrogen and carbon of some Kansas soils. Jour. Amer. Soc. Agron. 31(7): 625-632. 1939.

—In comparison with samples taken from sod land, sites in 20 farmers' fields lost 16.8% more organic matter where cultivation was up and down the slope than where it was across the slope. Across the slope cultivation brought about a 37% loss of organic matter. An inverse correlation was found between the loss of organic matter resulting from cultivation and the amt. of annual rainfall.—J. C. Hide.

15551. HUDSON, H. G. Population studies with wheat. Jour. Agric. Sci. 29(1): 76-109. 15 fig. 1939.—The design and field technique of 2 large-scale expts., laid down to investigate the problems of sampling and "propinquity" are described in detail. These expts. were designed so that plant number, stem number, ear number, straw weight and grain weight for 7200 lengths of 6 inches of drill row, together with the position of each observation, might be obtained. The lowest sampling error, expressed as a percentage of the mean, is obtained by using the smallest sampling unit but the large number of sampling units of this size that would have to be taken make it impracticable. Optimum sampling unit consists of 6 inches of drill row taken as 3 inches in 2 adjacent rows. As size of sampling unit is more important than shape in determining its accuracy, little was lost by using sampling units of 18 inches in 5 adjacent rows. The observations of grain weight require a sample about twice

as large as that required for other observations. The larger the plot the lower the sampling percentage necessary to obtain any given accuracy. Subdividing plot and taking equal numbers of sampling units from each subdivision greatly increases the accuracy of sampling. The actual percentages necessary to insure accuracy under various plot sizes and degrees of subdivision are given.—T. D. Jarvis.

15552. KARRAKER, P. E., and C. E. BORTNER. Availability of soil moisture, particularly as affected by depth,

15552. KARRAKER, P. E., and C. E. BORTNER. Availability of soil moisture, particularly as affected by depth, in the soil of the Kentucky Experiment Station farm at Lexington. Jour. Amer. Soc. Agron. 31(7): 653-660. 1939.— Moisture was determined in different layers of Maury silt loam on the Kentucky Experiment Station farm in variously cropped and uncropped land in the dry years of 1930 and 1936. Below 4 or 5 feet the soil contained approx. its maximum field capacity. Above this, moisture decreased towards the surface but below 2 to 3 feet no faster in the cropped than in the uncropped areas. Above 2 to 3 feet the decrease was considerably greater in the cropped than in the uncropped areas, indicating that the crops obtained water chiefly from the top 2 to 3 feet. Observations of depth of root penetration showed that the crops did not root effectively below this depth. Corn was also grown in pots in the surface soil was unavailable to the plants and 23 to 24% in the subsoil. The field capacity of the soil of each of the 2 layers is about 30%, so that even if crops root extensively in the subsoil, the amt. of water obtained here would be small.—Authors.

15553. KHOROSHAILOV, N. V. Kultura Mestnogo Espartzeta v Gruziinskoi SSR. [The culture of local Esparzet (Onobrychis antasaitica) in Georgia SSR.] Selektzia i Semenovodstvo (Plant Breeding and Seed Growing) 9(2/3): 44-45. 1939.—A local var. of esparzet is much better adapted to local conditions than the European vars. The division of fodder crops of VIR in Georgia, SSR, is experimenting with the development and improvement of local vars.—J. W. Pincus.

15554. LIVERMORE, J. R. Correlation of seedling performance in the greenhouse and subsequent yield in the field. Amer. Potato Jour. 15(2): 41-43. 1939.—The expts. included populations varying from 82 to 1126 individuals. Correlating "weight of tubers in greenhouse" with "weight of tubers in the field" the coefficients varied from +.070 to +.569; the second high was +.428. There is an indication that some association exists but it is not sufficiently strong to be of material help in selecting high-yielding seedlings. The coefficients of correlation for "height of plant in greenhouse" and "weight of tubers in the field" varied from -.073 to +.272. Correlating "height of plant in greenhouse" and "vigor of plant growth in field" the "r" values varied from -.174 to +.049. The correlation of "height of plant in greenhouse" with "weight of tubers in greenhouse" resulted in coefficients ranging from -.062 to +.275. So far as the conditions of this expt. are indicative of environmental conditions elsewhere, one must conclude that the association between greenhouse performance and field performance is so slight that the seedling growth in the greenhouse is of very little help in detecting superior yielding ability either in the greenhouse or in the field.—J. R. Livermore.

so sight that the seeding growth in the greenhouse is of very little help in detecting superior yielding ability either in the greenhouse or in the field.—J. R. Livermore.

15555. MEREDITH, W. O. S., H. ROWLAND, and J. ANSEL ANDERSON. Malting quality of Canadian barleys. II. Nineteen varieties, 1936 and 1937 trials. Sci. Agric. 19(6): 389-403. I fig. 1939.—From 6 to 59 samples of each of 18 Canadian vars. of barley were compared with corresponding samples of the standard var., O. A. C. 21. Mensury, and Mensury Ott. 60 are considered fully equal in quality to O. A. C. 21 with respect to all properties measured. Olli yields higher values for malt properties but this advantage is partially offset by low 1000-kernel weight and percentage plump barley. Gartons, Peatland, Newal and Velvet should be considered somewhat inferior to the standard because of high N content and low extract yield. Brio, though high in extract, is low in disatatic activity; Pontiac is low in extract; and Lapland, though similar to Olli in other respects, is very low in 1000-kernel weight and percentage plump barley; these 3 vars. are not considered promising. Trebi, Nobarb, Regal and Wisconsin 38 exhibit deficiencies with respect to the 3 main malt properties studied. Data on the 2-rowed vars., Hannchen, Charlottetown 80, Victory, and Rex, are presented; 2-rowed vars. do not modify as readily

as 6-rowed vars., and the demand for the former class of barley for malting in Canada is almost negligible.—J. A.

15556. MILLAN, ROBERTO. Noticias acerca de las variedades de papa cuyo cultivo se radico en la Argentina hasta 1936. [Notes upon the varieties of potatoes the cultivation of which has been established up to 1936.] Rev. Argentina Agron. 6(1): 41-48. 3 fig. 1939.—The author mentions the confusion of names, emphasizing the tendency to name imported vars. after the country from which imported. In a few instances the names refer to shape of tubers or other plant characters. A list of established vars. with descriptions, origins, qualities and characteristics is given.—J. W. Gilmore.

15557. MUNSELL, R. I., and B. A. BROWN. The nitrogen content of grasses as influenced by kind, frequency of application, and amount of nitrogenous fertilizer. Jour. Amer. Soc. Agron. 31(5): 388-398. 1939.—Eight N carriers were applied to pure stands of Kentucky bluegrass and Rhode Island bent grass on Charlton soil in Connecticut. Other plots received Calnitro at varying frequencies and rates. The 3½-inch clippings obtained during 1936 and 1937 were analyzed for total N. (NH₄)₂CO₅ was the only carrier that failed to increase the N content significantly. The stimulative effects of all N carriers were confined chiefly to the first month after application. Using the same amt. of fertilizer, the same increases in total N were obtained from 6 monthly and 3 bimonthly applications. Calnitro, Ca(NO₃)₂,

(NH₄)₂SO₄ and NaNO₃ were the most efficient carriers in

respect to percentage recovery of N.—R. I. Munsell.

15558. MUTINELLI, ARTURO. El pasto gordura (Melinis minutiflora) como forrajera para noreste Argentino. [Grease grass (molasses grass) as a forage for northeastern Argentina.] Rev. Argentina Agron. 6(1): 1-14. 3 fig. 1939.— A brief botanical description and a discussion of origin and agronomic characteristics are given. About 180 days are required for maturity. It produces annually 41 to 56 metric tons of green or fresh material per hectare with a hay yield of 26-31% of the above. From 3 to 4 cuttings per year may be made. Its minimum temp. resistance is —2C and burning over will kill it. It is perennial under the most favorable conditions of moisture and temp., but over the major area of the region it is annual. It is considered medium in forage value, but because of its high yield it is recommended for the humid regions of northeastern Argentina (Missiones and Corrientes). Its quality is highest if cut just before blooming. Analyses are given. Its reputed quality of repelling snakes, ticks and lice is supported by these expts.—J. W. Gilmore.

15559. NELSON, E. W., and C. H. WASSER. Reseeding

15559. NELSON, E. W., and C. H. WASSER. Reseeding with grasses native to Colorado increases forage crops on depleted ranges. Colorado Farm Bull. 1(1): 9-13. 1939.— Reseeding practices suggested as productive on depleted ranges in different parts of the State include good soil, drilling seed of adapted grasses from 0.75 to 1.5 in. deep—preferably 1 in. deep and early on well-prepared seedbeds, seeding in high stubble where soil blowing occurs or after vegetation is removed in nonblowing areas, mowing weeds on newly seeded areas, where practicable, at least twice a year, and permitting no grazing in the 1st year after seeding. Improvement by better grazing systems should be tried before artificial reseeding is attempted.—Courtesy Exp. Sta. Rec.

15560. OJALA, E. M. Vernalization of potatoes. Results of experiments at Pukekohe. New Zealand Jour. Agric. 58 (1): 15-16. Illus. 1939.

15561. PEARSON, NORMA L. Relation of the structure of the chalazal portion of the cotton seed coat to rupture during ginning. Jour. Agric. Res. 58(11): 865-873. 3 pl., 2 fig. 1939.—During ginning, fragments of the seed coat with attached fibers may be broken from the chalazal end of the seed (chalazal chipping), thereby adding undesirable foreign matter to the lint. Study of the seed coats of Super Seven, Acala (Gossypium hirsutum) and Pima (G. barbadense) showed that the chalazal portion has several characteristic features. One feature important from the standpoint of chalazal chipping is the spongy tissue of the outer pigment layer. This spongy tissue constitutes a weak place in the seed coat and in chalazal chipping, is the tissue in which the rupture occurs.—N. L. Pearson.

15562. POHJAKALLIO, ONNI. Kimalainen puna-apilan

pölyyttäjänä. [Bumble bees as pollenizers of red clover.] Luonnon Ystävä 42(2): 61-67. 1938.—Bumble bees are practically the sole pollenizers of red clover in Finland. Bombus distinguendus was seen almost exclusively on red-clover fields. Other species of bumble bees were seen almost equally on various plants.—The bumble bee, while collecting honey, generally keeps to flowers of the same species during a given round, but a change to flowers of another species occasionally takes place. B. distinguendus rarely changes to flowers of another species; B. agrorum changed more frequently.—The natural propagation of red clover in Finland may be due almost exclusively to the pollination work of the bumble bees that change host plants.—K. Multamäki.

15563. PSHENITCHNII, J. P. Vyssokii Oorojai Semian

Jitniaka v 1938 godu. [High yields of crested wheat-grass in 1938.] Selektzia i Semenovodstvo (Plant Breeding and Seed Growing) 9(2/3): 43-44. 1939.—A yield of 4.33 centners per hectare of seeds and 11.4 c. of straw was obtained at the

per nectare of seeds and 11.4 c. of straw was obtained at the Kamyshinsk Plant Breeding Station. As 1938 was a dry year, the yield is rather remarkable.—J. W. Pincus.

15564. RICHER, A. C., and J. W. WHITE. A study of correlation of chemically available phosphorus with crop yields. Jour. Amer. Soc. Agron. 31(5): 431-437. 1939.—A comparison was made of readily available P as measured by the Truog method, with crop yields of 2 field plat fertilizer expts. located at the Pennsylvania Agric. Expt. Station. There is no correlation of available P with crop yields in the comparison of plats receiving various carriers of P, such as superphosphate, rock phosphate, basic slag, and bone meal. Truog's reagent dissolved considerably more P from soils treated with either rock phosphate or bone meal than is easily available to the plant. However, on the Jordan Soil Fertility Plats, where P is mainly supplied by superphosphate, the coefficient of correlation was re-

markably high.—Authors.

15565. ROSS, A. M. Some morphological characters of Helianthus annus L., and their relationship to the yield of seed and oil. Sci. Agric. 19(6): 372-379. 1939.—In a field expt. at Ottawa, Canada, 18 strains of sunflowers were studied, each of which had been inbred for 8 generations, thus being extremely uniform. Two groups of coefficients of total correlation were obtained, the 1st group having the percentage of oil in the seed and the 2d group the yield of seed as the dependent variable. Significant correlations were found to exist between these variables and some factors such as the area of the leaves, number of leaves, diameter of main heads, height of plants, number of branches, number of days from seeding to blooming, and number of heads per plant. In a sunflower breeding project which has for its aim the production of a high seed-yielding var. of high oil content, the taller, non-branching types are worthy of special consideration as basic breeding material.—A. M. Ross.

15566. SANDO, W. J. Effect of mutilation of wheat seeds on growth and productivity. Jour. Amer. Soc. Agron. 31(6): 558-565. 1 fig. 1939.—Whole kernels and germ-end sections of half and \$\frac{1}{3}\$ kernels of Dawson and Nittany winter wheats were planted in rows in the field. Whole kernels were superior to half and \$\frac{1}{3}\$ kernels in germination and in subsequent plant survival, number of culms per plant (one exception), total weight per plant, and grain yield per plant. Half kernels were superior to a kernels (one exception). Half kernels, the cut ends of which were capped with paraffin were superior to unparaffined half kernels except in seed germination and in percentage of seeds producing mature plants. Whole, half, and 1 seeds planted in flats containing sterilized and unsterilized soil in the greenhouse confirmed the results of the field plantings.-W. J. Sando.

15567. SCHMIDT, R. Sweet potatoes. A summary of results of recent fertilizer experiments. Commercial Fertilizer 58(3): 12-14. 1939.

15568. SCHOTH, H. A. Ladino clover for western Oregon. Oregon Agric. Exp. Sta. Circ. 129. 1-8. 2 fig. 1938.—Practical suggestions for growing Ladino clover (Trifolium repens latum) based on the cooperative experiments and observations consider environmental needs, seedbed preparation, seeding mixtures and practices, fertilizer and irrigation requirements, and methods of managing pasture and handling the crop for hay and seed.—Courtesy Exp. Sta. Rec. 15569. SIEBERT, HERMANN. Der Einfluss von steig-

enden Stickstoffgaben auf Ertrag und Güte einiger Zwischenfrüchte. Landw. Jahrb. 87(1): 112-158, 1939.—N fertilization of rye, rape, sudan grass, corn, sunflowers, buckwheat and lupines was systematically varied from 0 to 120 kg. per hectare in conjunction with normal applications of K2O and Green matter yields and water uptake were increased. The crude protein content was increased by 50 to 180% as a result of N fertilization up to a dose of about 200 kg. per hectare. The total yield of crude protein was increased in some cases by 400%. Increases in non-protein nitrogenous substances followed increases in protein N. Crude fiber content was unaffected and crude fat was affected very little. Ash content was moderately increased and of the nutrients, Ca uptake was favored the most and P the least. N fertilization had no apparent effect on the composition and yield of

yellow sweet lupines.—I. C. Feustel.

15570. SPRAGUE, G. F. Corn hybrids for Missouri.

Missouri Agric. Exp. Sta. Circ. 201, 1-27, 23 fig. 1939.—

Methods of producing and testing hybrid corn are outlined, and its value of the control of the cont and its value and limitations are pointed out. Hybrids recommended for Missouri from results of performance tests include Missouri No. 8 and No. 47 for culture throughout the State, with No. 47 usually excelling in northern Missouri, and Iowa 13 for extreme northern Missouri.—Courtesy Exp.

15571. WHITE, J. W., F. J. HOLBEN, C. D. JEFFRIES, and A. C. RICHER. Fertility studies on Dekalb soil and their application to farmland in Pennsylvania. Pennsylvania vania Agric. Exp. Sta. Bull. 370. 48p. 12 fig. 1939 .on which the plat expts. were located in Snow Shoe Township, Centre County, showed a weighted crop yields index of 76.6 compared to 94.8% for the average of the entire Dekalb farm land of the State. The expts, were started in 1916 and included 40 plats divided into 4 fields, 3 in a 4-yr. grain rotation and 1 in permanent pasture. The land was classified as submarginal land and had been abandoned for 40 yr. The economic returns indicated that this type of farm land is capable of profitable production under a system of farm management including the systematic use of lime, commercial fertilizers, and manure. In the production of pasture grasses, the L+PKN treatment showed the maximum improvement. If L+PKN is expressed as 100 the relative returns were from L+P 66, from L+PK 88, and from L+MP 74. The relative crop-producing values of P, K, and N for the pasture plats were P 60, K 20, and N 20. The economic returns from 16 yr, of liming were similar in the case of limestone and hydrated lime. Based on the more economical fertilizer treatments previously indicated, the yields of crops at Snow Shoe were raised from a weighted crop yields index of 76.6 to a crop-producing value of 113 (the State average being taken as 100).—Courtesy Exp. Sta. Rec.

15572. WOLF, BENJAMIN. Experiments with boron on some New Jersey soils. Soil Sci. 48(1): 41-57. 1939.—Crops were grown without added borax, and with various amts. of added borax, on light New Jersey soils in pots receiving chemically pure salts and watered with distilled water. At the pH of the soil as taken from the field and without treatment, only Sassafras loam soil which has received no fertilizer for 30 years showed a beneficial response to additions of borax. Severe B toxicity symptoms appeared on plants receiving 40 lbs. of borax per acre, and mild toxicity at 20 lbs. of borax per acre. Four of these soils, when limed to a pH above 7, gave a beneficial response to borax. In some cases 5 lbs. of borax were sufficient, and in no case was there any beneficial response to applications above 20 lbs. per acre. The B content of plants was markedly increased as the B content of the soil increased. Liming the soil above a pH of 7 markedly reduced the amt. of B in the plant.—B. Wolf.

SOIL SCIENCE (EDAPHOLOGY)

15573. BACON, S. R., E. H. TYNER, W. L. BRUCE, DAVID FRANZEN, and D. B. DODSON. Soil survey of Frontier County, Nebraska. U. S. Dept. Agric. Bur. Pl. Indust. 1935(9): 1-34. Map, 1 fig. 1939.

15574. BEHR, GEORG. [The influence of manure on soil used in the soil layers of a compost heap.] Jour. Landw. 86(3): 199-215. 1939.—Compost was prepared in metal cylinders by alternating layers of manure and soil. The

lowest layer of soil was tamped, the above layers were filled in loosely. Each manure layer was compacted. The compost was prepared in April and allowed to stand until Oct. The soil in the various layers was enriched in N as compared to its original condition although there appeared to be little or no change in the relative proportions of mineral and organic substance, as measured by loss on ignition. Citric acid-soluble P was increased in the soil layers. Likewise, but to greater extent, both citric acid-soluble and CO₂-saturated water soluble K₂O were increased in the soil layers. Fresh manure used in making compost enriched the soil in total N and NH3-N more than rotted manure but the effect on mineral nutrients was about the same.-W. H.

15575. CARMAN, P. C. Permeability of saturated sands and clays. Jour. Agric. Sci. 29(2): 262-273. 1939.—The permeability of a water-saturated sand or fine powder can be calculated with considerable accuracy, if the porosity and the specific surface are known. In particular, the Kozeny theory here discussed leads to a useful relationship between permeability and porosity. Clays do not conform to the theory in its simple form, but the theory may be modified to give a satisfactory representation of the data available. The physical grounds for this modified theory are discussed in some detail; though open to criticism it is in harmony with our present knowledge of clays. An important deduction which follows from the modified theory is that clays may have zero permeability at quite considerable porosities, e.g., at $\epsilon = 0.207$ for a clay soil and $\epsilon = 0.355$ for a plastic clay.—T. D. Jarvis.

15576. DUNNEWALD, T. J., OREL TIKKANER, and WESLEY ROATH. Soil survey of Johnson County, Wyoming. U. S. Dept. Agric. Bur. Pl. Indust. 1933(28): 1-34. Map,

Ing. U. S. Dept. Agric. Bur. Pt. Indust. 1935(28): 1-34. Map, 2 fig. 1939.

15577. GEIB, W. J., and T. H. BENTON. Soil survey of Ida County, Iowa. U. S. Dept. Agric. Bur. Pt. Indust. 1933 (30): 1-32. Map, 1 fig. 1939.

15578. MILLER, JOHN T., ARTHUR E. TAYLOR, and W. E. THARP. Soil survey of Logan County, Ohio. U. S. Dept. Agric. Bur. Pt. Indust. 1933(29): 1-48. Map, 6 pt., 1 fig. 1939.

15579. SOIL SCIENCE SOCIETY OF AMERICA. Proceedings of the meeting held in Washington, D. C., November

ceedings of the meeting held in Washington, D. C., November 16-18, 1938. Vol. 3. x + 369p. illus. Edwards Brothers, Inc.: Ann Arbor, 1939. Pr. \$5.

15580. TORET, G., et H. MALTERRE. Les sols de la plaine maritime picarde. Marquenterre et Bas Champs (à suivre). Ann. Agron. [Paris] 19(1): 24-44. 1939.—A dispussion of the replegical critici of the soils of this recipe. cussion of the geological origin of the soils of this region and their geographical limits. Chemical and physical analyses are given. Later, detailed soil studies with conclusions

will be published.—R. R. McKibbin.

15581. WATSON, G. C. The soil and social reclamation.

xvi+173p. P. S. King and Son, Ltd.: London, 1938. Pr. 7s. 6d.—This is a popular discussion of the importance of the soil and its conservation in relation to social conditions and civilization. The topics treated include the significance, defence, and claims of the soil, water conservation, erosion, the functions of forests, fallowing, the soil and nutrition, and the maintenance and exhaustion of soil fertility. A chapter on the soil versus the laboratory contains criticisms of pasteurization of milk, soilless agriculture, and the adequacy of the laboratory to correct man's prolonged mis-management of the soil. The urge for patent medicines, drugs, and narcotics are attributed to man's detachment by urban life from the natural products of the soil.—C. Kofoid.

15582. WHELAN, L. A. The base status of Scottish soils. II. Further studies of the effects of lime on typical soils from Northeast Scotland. Jour. Agric. Sci. 29(2): 306-319. 1939.—In 1936, Mitchell reported on Part I of this investigation which covered studies to determine the effects of lime on 5 acid soils during the year after its application. The present paper reports studies on the following points: the effects of lime on the base status of these soils during the 2d and 3d year after application; movement of the lime into the subsoil; extension of the investigation to 2 additional soils, one derived from slate and the other from olivine norite; and physical investigations on the soils and of their clay fractions. On 4 of the original soils the full effect of the lime on the surface soil has been largely maintained up to the end of the 3d year. The 5th, a soil of low base exchange capacity, shows a considerable loss of lime by the end of the 2d year. Very little of the lime leached from the top 9 inches of soil was retained in 2d 9 inches. On soil of low base exchange capacity, during 2 years after liming, the percentage saturation of the subsurface soil showed an increase from 64 to 67% and the surface soil a decrease from 92 to 74%. The existence of a low liming factor (1.5) previously found to hold for a geologically basic soil, has been verified and found to apply also to a soil derived from slate. A fundamental property of the soils with a low liming factor is the high content of inorganic and organic fine material. Secondary characteristics that distinguish these soils from the others are the high. tics that distinguish these soils from the others are the high

values for hydroscopicity and heat of wetting.—T. D. Jarvis.

15583. WILDERMUTH, ROBERT, ARTHUR E. TAYLOR,
H. R. ADAMS, JOHN LAMB, Jr., and D. G. GREENLEAF.

Soil survey of Orleans County, New York. U. S. Dept. Agric.

Bur. Pl. Indust. 1932(34): 1-102. 2 maps, 1 fig. 1939.

HORTICULTURE

F. C. BRADFORD, Editor

(See also in this issue Entries 14361, 14427, 14565, 15405, 15486, 15511, 15535, 15537, 15699, 15702, 15706, 15707, 15714, 15729, 15730, 15739, 15741, 15744, 15758, 15762, 15767, 15783, 15836, 15839, 15858, 15859, 15860, 15866, 15869, 15870, 15878, 15892)

15584. BARTHOLOMEW, E. T., and W. B. SINCLAIR. Distribution of soluble solids in citrus juices. California Citrograph 24(10): 352, 362, 363, 382, 383, 384. 1939.—Previous investigators have shown that the soluble solids are considerably greater in the stylar end of certain mature citrus fruits than in the stem end. A study was made to correlate the percentage of soluble solids with the differential response of fruit segments to temp. Separate de-terminations were made of the percentage of total soluble solids in the stem and stylar halves of each individual segment in 94 valencia oranges. It was found that the total soluble solids of many of these immature segments was greater in the stem end than in the stylar end half. As the season advanced and the fruits became more mature, all segments had a greater total soluble solids content in the stylar end than in the stem end half as has been shown by previous investigators. Since freezing temps, usually occur before the latter part of January it is not surprising that one should find segments that were frezen in the stylar and not in the stem half. A given segment may contain from 0 to 3.5% less total soluble solids than another segment in the same fruit. The paper contains comparative analyses of

navels and valencia oranges of different sizes.—W. B. Sinclair. 15585. BOISEAUMARIÉ, P. L. de, G. KUHNHOLTZ-LORDAT, et G. MATHIEU. Chateauneuf-du-Pape. Ann. Agron. [Paris] 9(1): 45-85. 1939.—The association between Lavandula latifolia and Thymus vulgaris is considered one of the best criteria of suitability for wine grape culture of the soils of Chateauneuf-du-Pape. In addition, there are many factors, e.g., soils, climate, grape vars., vineyard practices, which govern the production of a distinctive "wine of the region."—R. R. McKibbin.

15586. BOSWELL, VICTOR R., E. H. TOOLE, and D. F.

FISHER. A study of rapid deterioration of vegetable seeds and methods for its prevention. Proc. Amer. Soc. Hort. Sci. 36: 655-659. 1938(1939).—The moisture content that will develop in seeds of 10 vegetable spp. was determined at 50° and 80° F for atmospheric relative humidities from 45 to 85%. The regression is linear, within these limits, and has been calculated for each kind of seed. At high temp. (80° F) and high humidity (75-85%) changes in weight of seed were found unsafe criteria of change in moisture content because of losses of dry matter and accumulating of water respiration. Some seeds are seriously injured by a moisture content harmless to others at the same temp. At 80° F and 80% humidity sweet corn, peanut, onion, and spinach deteriorated below good commercial grade in 10 to 20 days. Others were less susceptible, beet being uninjured in 110 days. Some seeds are damaged at 65% humidity, while 45 to 50% is a safe level for most. Seeds will develop dangerously high moisture content at low temp. and become injured thereby upon removal to a higher temp. They must be kept dry, even in cold storage, if subsequent damage is to be avoided. Small seeds like beet, cabbage, carrot, onion, spinach, and tomato that have developed a dangerous moisture content can be restored to a safe level by fast artificial drying at 120°-150° F with suitable equipment, without injury. This must of course be done before the high moisture has prevailed long enough to weaken the seed. Beans and peanuts can not be safely dried at 150° F.—V. R. Boswell.

15587. BOYNTON, D. Soils in relation to fruit growing the safely dried at 150° F.—V. R. Boswell.

15587. BOYNTON, D. Soils in relation to fruit growing in New York. XIV. Tree behavior on important soil profiles in the Finger Lakes area. Bull. [New York] Cornell Univ. Agric. Exp. Sta. 711. 1-21. 20 fig. 1938.—Apple and cherry trees on Ottawa loamy fine sand developed deep and extensive roots and vigorous tops. Dunkirk silty clay was also satisfactory where the surface drainage was good. Honeoye, Lansing, and Darien soils are adequately drained but are sometimes underlaid less than 3 ft. below the surface with a compact, unweathered glacial-till sub-soil. Ontario loam proved satisfactory in the area studied. Lyons silt loam showed slow internal drainage and compact, shallow subsoil unfavorable to the Rhode Island Greening apple. Where Lansing and Darien soils were underlaid with bedrock closer than 3 ft. to the surface, growth of trees was reduced and mortality became a factor; in the dry summer of 1936 sweet cherries on this type of soil suffered serious losses. The importance of examining soils prior to setting out orchards is stressed.—Courtesy Exp. Sta. Rec.

15588. BROWN, DILLON S. A preliminary report on a study of the nutrient level of orchard soils in the eastern panhandle of West Virginia and its relation to tree condition and productivity. Proc. Amer. Soc. Hort. Sci. 36: 45-48. 1938(1939).—100 soil samples, taken at a depth of 0-8 inches and representing the major soil series encountered in apple orchards in Berkeley and Jefferson counties, were analyzed for available P, exchangeable K, pH, and organic matter. The results indicate a trend toward a more favorable nutrient level in the soils of limestone origin than in those derived from non-calcareous shales. The slightly lower nutrient level of the shale soils is associated probably in only a slight degree with the inferior performance of trees and orchard cover on these soils and that other factors, such as moisture relationships, are of equal or greater importance.

—D. S. Brown.

15589. BROWN, DILLON S., and R. H. SUDDS. The removal of soot, deposited by smoke from industrial sources, on apples grown in the bottomlands along the Ohio River in the northern panhandle of West Virginia. Proc. Amer. Soc. Hort. Sci. 36: 234-238. 1938(1939).—Soot, deposited by industrial smokes, on apples of the Willow Twig var. grown in a riverside orchard was effectively removed when a 10% soln. of "B W" brand Na silicate at 80° F was used in a Bean Model E underbrush-flood washer followed in tandem by a Bean No. 7 2-way cleaner. The 2-way cleaner was necessary to remove the soot from the stem ends of the apples. Solutions of HCl, with and without Vatsol, and of other silicates, and mineral oil emulsions in the Model E machine were variously less effective in loosening the soot for removal by the 2-way cleaner.—Authors.

15590. CASSEBEER, F. W. Survey of new Gladiolus. Flow. Grow. 26(3): 115-117, 132. Illus. 1939.

15591. COLBY, A. S. Red and black raspberries: Varieties and culture. Bienn. Rept. Kansas State Hort. Soc. 44: 80-89. 1936-37(1938).—An historical sketch of the development of red, black and purple raspberries is given. Among the vars. of red raspberries discussed are Latham, Viking, Van Fleet, Chief, Newburgh, Taylor, Marcy, and Indian Summer; blackberry vars. discussed are Doolittle, Kansas, Cumberland, Gregg, Quillen, Dundee, Naples, Bristol, and Evans. Selection of planting stock, selection of a site,

application of fertilizers, pruning, and pest control are briefly discussed.—G. A. Filinger.

15592. DARROW, GEO M. Progress in strawberry culture and breeding. Bienn. Rept. Kansas State Hort. Soc. 44: 75-79. 1936-37(1938).—Strawberry vars. recently introduced are: Borden, Claribel, Howe, Jim, John, Louise, Simcoe, and Wright, by the Canadian station at Ottawa; Pathfinder, by New Jersey; and Connecticut 153, 282, and 111 by the Connecticut Expt. Station. The diseased condition, "yellows," which affects Howard 17 and Blakemore strawberries is now believed to be of genetic origin. Winter injury to strawberry plants can be largely prevented by earlier mulching.—G. A. Filinger.

15593. DICKSON, G. H. A biennial bearing record of an unproductive Baldwin block. Sci. Agric. [Ottawa] 19(9): 583-585. 1939.—In an orchard planted in 1921 at the Ontario Horticultural Expt. Station the Baldwin trees have borne very light crops. Nevertheless, a decidedly biennial bearing habit has been established in these trees. No cultural treatment has had any appreciable effect in altering this habit.—W. H. Upshall.

15594. ENZIE, W. D. Yellow sweet corn hybrids for New York. Bull. New York State [Geneval Agric. Exp. Sta. 686. 1-59. 4 pl. 1939.—The accelerated interest shown hybrid sweet corn in recent years has prompted a discussion of the vars. that are past the exptl. stage as evidenced by their introduction to the general seed trade. Scores of commercially available and exptl. hybrids have been grown on the Geneva [N. Y.] Station farms for several years. These have been critically observed and careful descriptive and yield records have been kept. 48 vars. are discussed. Historical information is given, such as parentage of the hybrid, the time it was made, released for trial, and introduced to the trade, and the names of persons and firms responsible for its development and introduction. Each var. is compared with several others in plant and ear characters, season, and utility. Detailed descriptions and meticulous field records are given. Yield records have been obtained for the important canning vars. and quality ratings are recorded of some of the vars. as canned whole kernel corn. Enzie.

15595. HAAS, A. R. C. pH as it affects growth of citrus, avocadoes and walnuts. Pacific Rural Press 138(1): 6. Illus. 1939.—The growth of the subtropical trees studied was better in acid than under alkali conditions, being best at a much greater acidity than is commonly believed desirable for healthy development. The conception that these trees grow well at pH values of 8.5 or higher is based on faulty methods of preparing soil samples for pH determination. These detns. should be made at the soil moisture content instead of with 1-5 or 1-10 soil-water ratios. Citrus trees in California are growing primarily in an acid rather than an alkali medium as has been commonly supposed.—C. S. Pomeroy.

15596. HALL, E. R. The pollination of the pear on Vancouver Island, British Columbia. Sci. Agric. 19(6): 358-371. 3 fig. 1939.—A marked degree of self-incompatibility is shown in most pear vars. and of the 52 vars. tested, 20 failed to mature fruit from self-pollinations. In addition to these, 13 vars. matured less than 1% of their flowers. A greater "drop" resulted from self-pollinations than from cross-pollinations. The "drop" from open-cross pollinations amounted to $\frac{2}{3}$ of the set. Controlled cross-pollinations were carried out on Anjou, Bartlett, Bosc, Boussock, Clairgeau, Conference, Hardy, Howell and Louise bonne de Jersey and satisfactory pollinizers determined.—E. R. Hall.

15597. HALMA, F. F., and E. R. EGGERS. A promising method for distinguishing between Mexican and Guatemalan avocado bark. California Avocado Assoc. Yearbook 1938: 107, 108. 1938.—When water was added to powdered bark, the bark of the Mexican group formed a coagulated or viscous mass, while that of the Guatemalan vars. remained more or less granular. Hybrids, such as Fuerte, behaved more like their Guatemalan parents.—Courtesy Exp. Sta. Rec.

15598. HODGSON, R. W., and E. R. EGGERS. Correlations between size of seed, seedling, and nursery tree in the avocado. *California Avocado Assoc. Yearbook* 1938: 92-96. 1 fig. 1938.—Large seeds tend to produce large seedlings, and

vice versa. When budded with known vars, the large seedlings tend to produce larger nursery trees. Trees resulting from the autumn start of buds were larger and more uniform than those started in the spring.—Courtesy

Exp. Sta. Rec.

15599. JOHNSTON, J. C. The effect of orchard heating on yield of Valencia oranges. California Citrograph 24(9): 318. 1939.—These studies were made in orchards in Tulare county in the central California citrus section following the heavy freezes of the winter of 1936-37. Orchards that were effectively heated in 1937 produced as much fruit in 1938 as in 1937 but orchards unheated in 1937, which lost all or practically all their crops that season, produced heavier crops the next season than did the orchards that had been effectively heated. This increase is believed to be a result of the differences in weight of crop matured in 1937.-C. S.

Pomeroy

15500. JOHNSTON, J. C. The use of blowers for frost protection. California Citrograph 24(10): 354, 370, 371. 1939.—Blowers have been used in Tulare county (California) citrus orchards about 20 yrs. Most of the early ones were used only a short time but many new installations have been made in recent years and 75 are now in use, about $\frac{2}{3}$ being electric driven. Blowers are generally effective in protecting orchards against frost when there is a ceiling of warm air and when temps, are not too low. They are most effective against early fall and spring frosts and under certain conditions have been used with substantial profit. Orchard heaters, to give comparable protection, can be installed at less expense and their number can be increased to take care of almost any degree of cold that may be expected.—C. S.

Pomeroy. 15601. JONES, H. A., and S. L. EMSWELLER. Effect of storage, bulb size, spacing, and time of planting on production of onion seed. California Agric. Exp. Sta. Bull. 628. 1-14. 2 fig. 1939.—The best temp. at which to store onion mother bulbs of a highly non-bolting strain of the Ebenezer var. was about 53.5° F. Plants from bulbs stored at this temp. for about 3 months bloomed and ripened their seed earlier, produced more seed stems and yielded more seed per acre than plants from mother bulbs stored at higher or lower temps. In a comparison of 8 sizes of mother bulbs of the Yellow Globe Danvers var. ranging in weight from about 15 to 90g., there was an increase in number of seed heads per plant, in seed yield per plant, and in seed yield per acre with each increase in size of bulb. When bulbs were set 3, 4, 6, 8 and 12 inches apart in the row, a significant increase in seed yield per plant was secured for each increase in spacing but a decrease in yield of seed per acre. Delay in planting date caused a delay in time of seed maturity and a decrease in yield of seed.—H. A. Jones. 15602. KNOTT, J. E., E. M. ANDERSEN, and R. D. SWEET. Problems in the production of Iceberg lettuce in New York. Bull. [New York] Cornell Univ. Agric. Exp. Sta. 714. 1-17. 6 fig. 1939.—Of vars. and strains of Iceberg lettice tested at several locations, the hybrid var. Imperial 44 showed unusual capacity for producing firm, marketable heads even under conditions that greatly reduced heading in other vars. Imperial 44 was slower to bolt than any other strain of the same type tested. As grown on well-decomposed muck soil, it had a much more spreading root system and fewer deep roots than White Boston, indicating a better feeding but possibly a poorer water-collecting capacity. Wider spacing than is usually alloted lettuce was needed to produce large heads of the Iceberg type. Too abundant feeding with too quickly available N made for poorer heading and greater susceptibility to tipburn. Water supply was apparently a vital factor, and a plentiful and relatively constant supply is considered essential for good heading. It is believed that water may be helpful in part by evercoming, to some degree, the detrimental effects of high temps. On most muck soils a water table of 18-24 in. should provide sufficient moisture without saturating the oil. Suggestions as to fertilization on muck and mineral oil are given. Imperial 44, notwithstanding its susceptibility o tipburn and failure to head under extreme temps., is the best var. of Iceberg lettuce yet introduced into the State.— Courtesy Exp. Sta. Rec.

15603. McGEORGE, W. T. Controlling alkali with typsum. Pacific Rural Press 138(2): 31. 1939.—Wherever

irrigation is practiced in semi-arid countries the alkali problem exists to a greater or lesser degree. Control work is usually not undertaken on agricultural land until harmful salts accumulate to a troublesome degree, but the problem should be studied just as diligently before it reaches the harmful point. The road to permanent productivity under irrigation is to always use hard water (lime salts) and if hard waters are not available, soft waters (soda salts) can easily be made hard by applying gypsum to them. If an appreciable amount of black alkali (Na₂CO₃) is present in the soil a ton or more of gypsum should be broadcast and turned into the soil followed by a thorough leaching. For controlling or preventing the accumulation of alkali a much milder treatment is sufficient such as keeping a small amt. of gypsum continuously in the irrigation ditches. This is an effective and economical means of insuring against structural deterioration of the soil or alkali accumulation in it.—C. S.

15604. MORETTINI, ALESSANDRO. Ricerche sulla biologia fiorale dell' Olivo. [Floral biology of the olive.] Nuovo Gior. Bot. Ital. 46(1): 1-70. 1939.—Numerous horticultural vars. of the olive are self-sterile, the flowers being unable to bear fruit either when self-pollinated or when pollen is derived from other trees of the same var.; but each selfsterile var. may be fertilized by some other self-sterile var. and produce fruit. The var. frantoio is definitely self-fertile. Ovary abortion is frequent in some vars., rare in others. The voluminous tables of exptl. data can not be here

summarized.—F. Ramaley.

15605. PICKETT, B. S. The place of research in a program for increasing apple consumption. Bienn. Rept. Kansas State Hort. Soc. 44: 30-35. 1936-37(1938).—After citing examples of industrial development which followed contributory research and invention this author lists and briefly discusses several research problems, the selection of which should increase apple consumption: value of scientific facts as a basis for salesmanship; the food value of the apple, and its therapeutic value; methods of preparing the apple for consumption, exact recipes; development of a larger group of apple by-products, and researches seeking the solution of certain economic and psychological problems. $-R.\ J.\ Barnett.$

15606. PICKETT, W. F. The story of an orchard. Bienn. Rept. Kansas State Hort. Soc. 44: 43-48. 1936-37(1938).— A brief review of the exptl. work at the Kansas Agric. Expt. Station orchard at Manhattan. Pruning, varietal studies, soil management, and spraying, are mentioned. Apple vars. are listed according to their ability to survive the 1934 and 1936 drouths.—W. F. Pickett.

15607. SCOTT, L. E. Response of peach trees to potassium and phosphorus fertilizers in the Sandhill area of the Southeast. Proc. Amer. Soc. Hort. Sci. 36: 56-60. 1938 (1939).—Pronounced K-deficiency symptoms developed in Elberta peach trees grown in a virgin soil of Norfolk coarse sand without added K fertilizers. These trees showed char-acteristic bronzed curled leaves and were much lower in fruit bud development and in fruit yield than normal trees. Omission of P under similar conditions did not result in such striking differences although the no-P trees have been significantly lower in yield, in annual increase of cross section area and in fruit bud development. P deficiency

uon area and in truit bud development. P deficiency symptoms of dull, dark green, heavy foliage appeared when the trees were 9 yrs. old.—L. E. Scott.

15608. SHEPARD, PAUL H. The relation of flower-cluster thinning and light pruning to yields of American grapes. Bienn. Rept. Kansas State Hort. Soc. 44: 72-75.

1936.37(1938)—Five years of grapes Concord. 1936-37(1938).—Five vars. of grapes, Concord, August Giant, Lindley, Eaton, and Merrimac were each pruned to 40, 60, 80, and 100 buds. Soon after the flower-clusters were formed they were pinched down to one cluster to the shoot on all except the 40 bud vines. The increase in yields per acre over a 3-year period, from those pruned to 40 buds to those pruned to 100 buds was as follows: Concord, 3,200 lbs.; August Giant, 3,000 lbs.; Lindley, 3,000 lbs.; Eaton, 1,200 lbs.; Merrimac, 8,000 lbs. Flower-cluster thinning costs about \$3 per acre.—G. A. Filinger.

15609. SITTON, B. G., and F. N. DODGE. Growth and fruiting of three varieties of pecans on different seedling rootstocks. Proc. Amer. Soc. Hort. Sci. 36: 121-125, 1938 (1939).—Pecan trees of the Stuart and Schley vars, worked on seedling of the Moore and Waukeenah pecans, and of the Mobile var. worked on seedling of Hicoria pecan and H. aquatica were planted as 1-yr-old whips in 1930, and paired according to height at that time. Statistical constants were calculated between the size of the top and yield of fruit in 1937. The cross sectional area of tree trunks is a reliable measure of the size of the tops of this group of trees. Schley trees on Moore root were 1.15 times larger and yielded 1.5 times more pecans in 1937 than those on Waukeenah roots. Stuart trees on Moore root were 1.14 times larger and yielded 1.6 times more pecans in 1937 than did those on Waukeenah roots. Mobile trees on H. pecan were 3 times larger and yielded 4 times more pecans in 1937 than did trees on H. aquatica.—B. G. Sitton.

15610. SUDDS, R. H., and R. S. MARSH. Some results and suggestions regarding the use of calcium Cyanamid on apples. Proc. Amer. Soc. Hort. Sci. 36: 36-40. 1938(1939).— Typical Cyanamid injury to foliage was observed in the autumn of 1937 on 20 randomized 26-year-old York Imperial apple trees receiving that material as part of an expt. located in a commercial orchard near Martinsburg, West Virginia, on soil classified as the Frankstown silt loam. The expt. was begun in 1936. The rate of application was 5\frac{1}{4} lbs. of Cyanamid per tree per year or an equivalent amt. of Chilean NaNO₃, (NH₄)₂SO₄ or urea. None of the 20 trees receiving the latter 3 N carriers showed any foliage injury similar to that exhibited by the trees to which Cyanamid had been applied. The growth and fruiting responses obtained from Cyanamid and NaNO2 were compared. No differences statistically significant were found for weights of roots 7 mm. in diam. and under and also for 2 mm. and under in soil samples from under trees receiving Cyanamid as compared with those which had received NaNO3. The average cumulative trunk circumference increments for the period 1936-1938 inclusive were significantly larger for the nitrated trees, as were the average yields per tree for the same 3-yr. period. No significant differences in the % of fruit set were found in 1938 following the foliage injury of 1937. Two conditions were held chiefly to be responsible for the injury: 1) application of the Cyanamid in rings about each tree under the spread of the branches which had the effect of raising the conc. per unit of area of the soil surface to double the amt. theoretically safe for such soils; and 2) the dry weather prevailing in 1937 from Feb. 23 until Apr. 26. The Cyanamid was applied on Mar. 26. The possible chemical changes occurring while the Cyanamid was lying on the soil surface were undoubtedly a contributory factor. Ring fertilizing single-tree or larger plots may be a questionable practice where Cyanamid is to be used.—R.H.

states area. Bienn. Rept. Kansas State Hort. Soc. 44: 51-56. 1936-37(1938).—The theme of this discussion is the basis on which intelligent selection of vars. of kinds of fruits adapted to the region may be made. Both tree fruits and small fruits are considered. New vars. versus old vars., the number of vars. in an apple orchard, varietal adaptation to soil characters other than physical type, and pollination requirements are discussed. Under the last heading all adapted kinds of fruits are discussed and specific classifications of varieties are given for many of them.—R. J. Barnett.

tions of varieties are given for many of them.—R. J. Barnett. 15612. TAYLOR, COLIN A. Reaching the young trees with broad furrows. California Citrograph 24(9): 316. Illus. 1939.—The expense of hand labor in preparing irrigation furrows close to young interplant trees may be very effectively avoided by using the recently developed tool that makes broad furrows [TAYLOR, COLIN A., Development of methods for thorough irrigation. California Citrograph 24(2): 52, illus. 1938.] and swinging it in toward the small trees behind an offset disk harrow.—C. S. Pomeroy.

15613. THROCKMORTON, R. I. Rejuvenation of nursery soils. Bienn. Rept. Kansas State Hort. Soc. 44: 97-103. 1936-37(1938).—For successful nursery production the soil must be of good physical condition and have an adequate supply of available and active N, P and K. The effect of the different nutrient elements on nursery stock development is discussed. The methods of producing and harvesting nursery stock tend to destroy good soil tilth and reduce the amount of active nutrients. Practical methods are given for improving the physical condition of such soils and in-

creasing the content of active nutrients.—R. I. Throck-morton.

15614. TIEDJENS, V. A., and L. G. SCHERMERHORN. Classification of tomato varieties according to physiological response. Proc. Amer. Soc. Hort. Sci. 36: 737-739. 1938 (1939).—A classification is suggested based on physiological condition of the foliage. 5 classes are suggested from the highly floriferous, weakly vegetative type to weakly floriferous, strongly vegetative types. This response of tomato vars. is associated with their minimum temp. requirements. The highly floriferous types have a higher temp. and, therefore, higher N requirement than the highly vegetative types.—Authors.

15615. Van HORN, C. W., A. L. SCHRADER, and I. C. HAUT. Root and crown development of strawberries. Proc. Amer. Soc. Hort. Sci. 36: 461-465. 1938(1939).—At Salisbury, Maryland, during 1937 field plots of matted rows, thinned rows with 20 runner plants per mother plant, and thinned rows with 12 runner plants per mother plant, showed early runner plants of Blakemore strawberry developed dry weight of roots at a rapid linear rate during a favorable growing season, but plants from matted rows ceased this rapid development in early fall compared with continued development of thinned plants. Rapid crown development occurred in the fall after an earlier slow steady rate of dry matter increase. Fertilizers applied in mid-August or mid-Sept. were effective in promoting increased dry matter of roots. The continued fall development of plants in thinned rows, as well as response to fall fertilizers, possibly has significance in the excellent fruiting behavior of such plants in the following spring compared with matted row plants.—C. W. Van Horn.

15616. WAHLBERG, HAROLD E. Windbreak plan for inner orchard. California Citrograph 24(9): 314. Illus. 1939. —With the acknowledged importance of windbreaks in exposed areas a diagonal grille system of planting has been devised to allow of a tree line across the middle of a 10-acre block without preventing uninterrupted movement for orchard operations. One row of orchard trees is removed and in its place short diagonal rows of 5 or 6 eucalyptus trees are planted 4 feet apart in the row, with rows 10-24 feet apart. This grille plan may be likened to the oblique squad formation in the marching line and allows orchard machines and irrigation furrows to pass through the windbreak so operations can be conducted on the entire orchard as a unit.—C. S. Pomeroy.

15617. WALKER, SAM J., and CHARLES D. SAMUELS. Disposal of orange waste as fertilizer. California Citrograph 24(10): 350. 1939.—From chemical determinations it appears that orange waste is of equal value to dairy manure except for use in the spring of the year when additional N will be required. As a fertilizer the value of orange waste is ½ that of dairy manure. 300 to 500 lbs. of the waste per tree is equivalent to 8-12 tons of dairy manure per acre.—C. S. Pomeroy.

15618. WELCH, J. E. Performance in Hawaii of tomato strains developed for the southern states. Proc. Amer. Soc. Hort. Sci. 36: 701-704. 1938(1939).—A total of 73 vars. and strains of tomatoes, representing important vars. grown in the U. S. and in Hawaii together with a number of hybrid selections developed under climatic conditions similar to those of the Territory, were tested over the course of 2 yrs. in 4 field plantings. On the basis of yield and descriptive data from the 3 tests harvested, all except 14 accessions have been eliminated. Break O'Day and Pritchard, the 2 most widely planted vars. in Hawaii were included among the final selections, but the results of these investigations indicate that certain unnamed introductions from Florida and Louisiana were superior to the above-named vars. at the location of the trials.—J. E. Welch.

15619. WESTER, ROBERT E., and ROY MAGRUDER. Effect of size, condition, and production locality on germination and seedling vigor of Baby Fordhook bush lima bean seed. Proc. Amer. Soc. Hort. Sci. 36: 614-622. 1 fig. 1938 (1939).—Clean lima bean seed of the Baby Fordhook var. that matured during a humid period at Beltsville, Maryland had a much lower germination percentage than seed from the same plants that matured during dry weather. Likewise seed of the same var. and stock that matured under humid conditions at Charleston, S. Carolina had a lower

germination percentage than seed which matured under dry conditions at Greeley, Colorado. The size of seedlings as measured by the green weight of the above ground portion was directly proportional to the size (diameter and weight) of the seed—Authors.

of the seed.—Authors.
15620. WIGGANS, C. C. Some results from orchard irrigation in eastern Nebraska. Proc. Amer. Soc. Hort. Sci. 36: 74-76. 1938(1939).—10 inches of water, pumped from an adjoining creek, was used to supplement a rainfall of 22-

23 in coming during the 1939 growing season. Irrigation reduced the proportion of fruit less than $2\frac{1}{4}$ in in diam. from 44.3 to 9.2% and increased materially the proportion of the fruits above $2\frac{1}{4}$ in. Soil moisture determinations made on a plat bountifully supplied with water indicated that for each 20-yr.-old Delicious tree there was used $\frac{3}{4}$ acre-inch of water during the season. Water usage totaled 38 inches, 22.68 inches coming from rainfall and 15.20 being extracted from the subsoil reserve.—C. C. Wiggans.

FORESTRY

W. N. SPARHAWK, Editor

(See also the section "Economic Entomology—Forest and Shade Trees"; and Entries 14388, 14389, 14431, 15470, 15485, 15514, 15515, 15516, 15706, 15764, 15765, 15774, 15798, 15853, 15865, 15885, 15888, 15909, 15910, 15912)

15621. AALTONEN, V. T. Über die bodenkundliche Bonitierung der Waldstandorte. I. Comm. Inst. Forest. Fenniae 25(1): 1-90. 21 fig. 1937(1938).—Determination of the productivity of soil on the basis of its properties is one of the most important objects of forest soil research. It is one of the most difficult problems, for productivity is usually the result of the combined action of several factors. This paper attempts to throw light on this problem with regard to Finnish conditions, partly on the basis of chemical and microbiological analyses, partly by studying the relation between the productivity of soil and its mineral composition, and partly on the basis of its physical properties. At least in moss forests, productivity is probably determined by soilmoisture conditions. In the best soils (grass-herb forests) lime is, next to moisture, apparently the most decisive factor.—From auth. abst.

15622. AALTONEN, V. T. Einige pH-Bestimmungen in Waldböden. Comm. Inst. Forest. Fenniae 25(2): 1-52. 8 fig. 1937(1938).—This paper descr. the distrib. of acidity in the soil profile, especially in the podsol profile, and gives data on the effect of storage of soil samples on acidity and the differences between pH values in water and in KCl. Storage generally lowers acidity, especially in strongly podsolized soils. The pH value increases with depth to the lower part of the B-horizon, then decreases, and gradually rises to the pH characteristic of the subsoil. In ordinary northern soils the max. is between 25 and 35 cm. depth and the decrease from 35 to 45 cm. The pH difference between water and KCl was least in the B-horizon and greatest in strongly leached A-horizon and in the subsoil of grassherb forests.—From auth. abst.

15623. AGUILAR, LUIS. Tapping Benguet pine in the Mountain Province. Philippine Jour. Forest. 2(1): 65-79. 2 pl. 1939.—Results of tapping Pinus insularis are given. The yield per cup was greatest with 5-day chipping intervals. Yields increased with diam. of tree up to 60 cm. There was no significant difference in yields on different sides of the same tree. Trees with deeply furrowed bark gave highest yields, those with smooth, scaly bark the lowest. There was little correlation of resin yield with temp., rainfall, or humidity. The av. yield per cup for each chipping was about 50 gm.; the annual yield about 3.6 kgm.—W. N. Snarhawk.

gave nighest yields, those with smooth, scaly bark the lowest. There was little correlation of resin yield with temp, rainfall, or humidity. The av. yield per cup for each chipping was about 50 gm.; the annual yield about 3.6 kgm.—W. N. Sparhawk.

15624. ALVINO, G. Panorama forestale del Hararino.
[Forest panorama of the Harar region. Ethiopia.] Agric. Colon. [Florence] 33(5): 286-293. 7 fig. 1939.—Forests are estimated to occupy about 10% of the district. Characteristic spp. are the conifers Podocarpus gracilior and Juniperus procera, which occur above 2,000 m. altitude, reach heights of 35 m. and diams. of 150 cm., and furnish timber of excellent quality. Important broadleaf spp. include Ekebergia rueppeliana, Brayera anthelmintica, Erica arborea, Olea chrysophylla, Cordia abyssinica, Croton macrostachys, Milletia ferruginea, Pygaeum africanum, Hypericum lanceolatum. Much Eucalyptus has been planted near villages. Acadia spp. and Euphorbia abyssinica, with other trees, are characteristic of the drier, open forests.—W. N. Sparhawk.

Acacia spp. and Euphorbia abyssinica, with other trees, are characteristic of the drier, open forests.—W. N. Sparhawk.

15625. BAADER, G. Der Kiefernüberhaltbetrieb im hessischen Forstamt Eberstadt. II. Das Verhalten der Überhälter. Allg. Forst- u. Jagd.—Ztg. 115(5): 141-148. 2 fig. 1939.—Measurements of 49 sample hold-over pines and 73 pines in closed stands showed clearly that releasing pine from competition results in a great increase in crown volume,

and that growth in diam., basal area, and stem volume is greatly stimulated if the trees are less than 100 yrs. old when released. The increased growth continues for about 60 yrs. With older trees the growth is stimulated for only a few yrs. Height growth of released trees is somewhat less than that of similar-sized trees in closed stands. Holdover trees were not fuller-boled than those in closed stands. Trees in closed stands had thicker bark. There was no significant difference in % of heartwood.—W. N. Sparhawk.

15626. BENINDE. Der Wasserfaktor im Kiefernnaturverjüngungsbetrieb. Zeitschr. Forst- u. Jagdw. 71(5): 217-231. 1939.—A critique of Wittich's paper on the water economy of sandy soils. The key to natural regeneration of pine on these soils is water, not light or soil composition. Natural regeneration can be relied upon only where the ground vegetation is favorable—generally a mixture of Calluna and Hypnum, but not Vaccinium. Unproductive loss of water through consumption of plants not producing wood should be avoided so far as possible. The favorable Calluna-Hypnum cover is found only under the shade of an old stand, and rarely on clear-cut areas.—W. N. Sparhawk.

15627. BURGER, HANS. Bodenverbesserungsversuche. I. Vorläufige Ergebnisse der Versuche im Stadtwald Zofingen. Mitteil. Schweiz. Anst. Forst. Versuchswesen 20(2): 247-306. 6 pl., 1 fig. 1938.—To investigate ways of improving forest soil that had deteriorated as a result of clear cutting, intermediate agricultural use, and planting (60 yrs. before) with practically pure spruce, 30 sample plots of 200 sqm. each were laid out in the spring of 1933 in the city forest of Zofingen, Switzerland. On some the moss and raw humus were hacked into the mineral soil; on others the moss and humus were removed and the soil hacked. Some of the plots were unfertilized, on others moss ashes were applied, on others ground CaCO₂ (500 gm. per sq.m.), and on others unslaked CaO. Some were inoculated by scattering good forest soil at rates of 0.25, 0.5, and 1.0 liters per sq.m. A light cover of twigs was strewn over some plots. On ½ of each plot 200 3-yr. beech seedlings were underplanted. The stand was thinned in 1933 and again 2 yrs. later, to open it up and create more uniform canopy over all plots. Preliminary results, to spring of 1937, are outlined. The soil structure was unchanged on untreated plots; where the soil had been loosened, it was already packed down by rain by autumn 1933, more so where the humus and moss were removed than where they were not. Twig covering retarded packing slightly; beech underplanting, noticeably. Moss ashes reduced acidity in the surface layer of soil the 1st yr., but the effect was not discernible after 5 yrs. Liming decreased acidity to an increasing extent through the 5 yrs., but was not sufficient to neutralize the soil completely. The ground vegetation on untreated areas was unchanged. and little new vegetation came in on areas merely hacked or treated with ashes. A moderate amount came in on plots that were hacked and treated with ashes and inoculated earth, and a rich flora (25 spp. or more) on the limed plots, especially those with inoculated earth. Unslaked lime was less satisfactory than ground limestone. Twig covering hindered the development of vegetation. The moss cover (mostly Hylocomium splendens, with some Polytrichum formosum) gave way to a cover composed mostly of Polytrichum formosum and Catharinea undulata on unlimed plots from which the original moss was removed. Under-

planted beech did better on limed than on unlimed plots. Bibliography of 57 titles.—W. N. Sparhawk.

15628. CAILLOUX, C. Les sapinières du Massif Central. Rev. Eaux et Forêts 77(5): 414-435. 1939.—The fir (Abies alba) forests of the Central Highland of France are of great economic value; their area is steadily increasing naturally and as a result of planting. Beech and other broadleaf spp. should be grown in mixture with fir, and the age of exploitability should be reduced to supply the most wanted sizes.-W. N. Sparhawk

15629. CAPPUCCINI, GIUSEPPE. Il rimboschimento in Sicilia. [Reforestation in Sicily.] Riv. Forest. Ital. 1(5):

295-309. 13 fig. 1939.

15630. CLARKE, S. H. Stresses and strains in growing timber. Forestry 13(1): 68-79. 1939.—The conclusions of recent investigators on the occurrence of stresses and strains in growing timber are reviewed. The formation, occurrence, characteristics, function, and properties of compression and tension wood are discussed; the formation of these tissues may be stimulated by various factors, but under natural growth conditions gravity is probably the most important. Whatever the forces responsible for their formation, the mature tissues carry latent compressive and tensile stresses respectively, which, it has been suggested, are important in maintaining stems and branches in an erect position. There is difference of opinion among investigators as to whether the tissues are to be regarded as formed merely as the result of forces acting on the cambium, or to serve a particular mechanical purpose. Attention is drawn to work on the existence of longitudinal strains in normal timber, and the significance of such strains is discussed.—S. H. Clarke.

15631. COSTER, CH. De beteekenis van de cultuur van Acacia decurrens in Nederlandsch-Indië. [Cultivation of A. decurrens in Dutch East Indies.] Tectona 32(4/5): 368-388. 1939.—On the basis of an analysis of the world production of tanning materials in general and of wattles in particular, the extension of cultivation of this sp. in the Dutch Indies

is recommended.—W. N. Sparhawk.

15632. CRUIKSHANK, J. W., and I. F. ELDREDGE.
Forest resources of southeastern Texas. U. S. Dept. Agric.
Misc. Publ. 326. VI+37. 1 map, 16 fig. 1939.—Information is presented on physical features, character of the forests, contents of saw timber and cordwood, ratio of increment to drain, and special-use resources, such as naval stores and

pulpwood.—Courtesy Exp. Sta. Rec.

15633. DARBELLAY, J. L'épicéa dans le vent. Jour.
Forest. Suisse 90(5): 101-104; (6): 121-126. 4 fig. 1939.—
Storms of Feb. and Dec. 1935 felled large volumes of spruce on the Swiss plateau. Damage in mixed stands containing

on the Swiss plateau. Lamage in mixed stands containing hardwoods was slight; it was greatest in pure, even-aged spruce stands. Beech, oak, and Scotch and white pines were relatively wind-firm.—W. N. Sparhawk.

15634. DESCH, H. E. The gross features of wood. Malayan Forester 8(2): 45-49. 2 pl. 1939.—A brief account of the gross features that affect the quality of wood. Saparada decompositions of the significant concluded from some parameters. wood should be rigidly excluded from semi-permanent and

permanent buildings in the tropics.—W. N. Sparhawk.
15635. DÜGGELI, M. Bodenverbesserungsversuche. II. Studien über den Einfluss der im Stadtwald Zofingen angewandten Massnahmen zur Bodenverbesserung auf die Bakterienflora des Waldbodens. Mitteil. Schweiz. Anst. Forst. Versuchswesen 20(2): 307-444. 1938.—A portion of the Zofingen City Forest (Switzerland) was cleared and used for agriculture for a few yrs. during the 19th century, and about 60-70 yrs. ago was planted to spruce. Cultivation rendered the soil much less porous than undisturbed forest soil nearby, with unfavorable results on the growth of the trees. In connection with expts. on methods of improving the soil [see in this issue entry 15627], bacteriological investigations of soil samples were carried out at various intervals in 1933-1937. Bacterial flora was considerably increased by hacking the soil, either with or without removing the humus cover; by underplanting beech; and by strewing the plots with ground CaCO₃, CaO, commercial fertilizers, or inoculated earth from hardwood forest. Scattering twigs or ashes or removing the raw humus had no significant effect. CaCO; and CaO were of approx. equal value. Com-mercial fertilizers (Thomas meal, potash salts, Chilean nitrate) were more effective than inoculated earth, but

more expensive. The favorable effect of inoculated earth increased with quantity used, but application of 0.25 liters per sq.m. was sufficient to give good results.—W. N. Sparhawk.

15636. DURANT, C. L. A note on the coastal forests of Kelantan. Malayan Forester 8(2): 50-52. 1939.—The coast of Kelantan (Malaya) is bordered with sand ridges, swamps, and coastal islands, all resulting from the interaction of siltladen streams and the monsoon blowing from the sea. Left to themselves, these areas become covered with forest of characteristic types. Much of the coastal forest has been destroyed by fire and grazing and the land has been occupied

by a worthless grass or sedge, interspersed with a thorny bush, Randia tomentosa.—W. N. Sparhawk.

15637. FUNICIELLO, LUIGI. II problema forestale in Tripolitania. Riv. Forest. Ital. 1(2): 27-36. 7 fig. 1939.— Deals with problems of afforestation in northern Africa.

15638. GIACOBBE, ANDREA. Il valore pratico dell'ecologia nella scelta delle specie legnose per i nostre rimboschimento. [Practical value of ecology in selecting trees for reforestation.] Riv. Forest. Ital. 1(3): 31-40. 4 fig. 1939. Establishment of forests is most certain of success if care is taken to select spp. that are ecologically best adapted to the site, in respect to both physical factors and stage of plant succession. When this is done, successful regeneration is possible by cheap, natural methods (e.g., sowing without preparing the ground or removing existing herbaceous or shrubby vegetation). An example is given of successful broadcast sowing of *Pinus maritima* on slopes in Tuscany, covered with dense Ulex and Erica, where most other spn. failed.-W. N. Sparhawk.

15639. GUINIER, PH. Utilisation en papeterie du bois de trois conifères américaines cultivés dans l'Est de la France (épicéa de Sitka, sapin de Vancouver, sapin de Douglas). Bull. Comité Forêts 11(77): 748-761. 1939.—Picea Douglas). Butt. Commer Forest 11(11): 135-101. 1555-1. Commer sitchensis, Abies grandis, and Pseudotsuga taxifolia, cut at 20-30 yrs. of age, furnish good pulpwood.—W. N. Sparhawk. 15640. GUT, CH. L'occupation de l'atmosphere. Jour. Forest. Suisse 89(12): 262-269. 3 fig. 1938.—This is the con-

cluding paper of a series (see Biol. Absts. 13, entry 4931). The disadvantage of the even-aged, regular stand is that the resources of soil and atmosphere are incompletely utilized at all times, and almost not at all during the period of reforestation and establishment of a new crop. Comparison of even-aged spruce approx. 40 yrs. old, at the time it was making its max current growth, with spruce selection forest at Couvet (Switzerland) showed a much wider variation in CO2 content of the air in the even-aged stand, with greater conc. at night and less available for assimilation during the middle of the day, than in the selection forest. The irregular selection forest has a greater supply of CO₂ available when it is needed and can utilize the sunlight to better advantage than the 1-storied stand with a continuous canopy at one level.—W. N. Sparhawk.
15641. GUT, ROB.-CH. La rejeunissement sous tutelle.

Jour. Forest. Suisse 90(8/9): 165-174. 6 fig. 1939.—In order to avoid their being torn out or crushed by snow and falling rocks, trees planted on steep mountain slopes should be set below older trees, stumps, rocks, or wooden posts.—W. N.

Sparhawk.

15642. HEIBERG, HANS H. H. En oversikt over proveniensproblemet hos våre viktigste skogstraer, furu, gran og bjørk. [The provenience problem of pine, spruce, and birch in Norway.] [With Ger. summ.] Meddelel. Norske Skogsforsøksvesen 6(2): 51-109. 5 maps. 1938.— Excepting a few studies on the western coast, the problem of climatic races of forest trees has not been investigated in Norway. With growing intensity of forest practice, it becomes increasingly desirable to ascertain which are the best races to grow in each locality. A plan of investigation is outlined, with suggestions as to localities and numbers of tests. In a given locality it may be best to use 2 different races; one with special ability to reproduce naturally on the poorer sites that will be managed extensively; the other capable of producing max. yields of high-quality timber, even though it will not reproduce naturally, for good sites where more intensive cultural measures are economically feasible. With birch the problem is more one of selecting and breeding individual trees of good quality than of selecting climatic races.-W. N. Sparhawk.

15643. HEIBERG, HANS H. H. Bunnvegetasjonen efter skogbrann i Øst-Norge. [Soil vegetation following forest fires in eastern Norway.] [With Ger. summ.] Meddelel. Norske Skogsforsøksvesen 6(2): 251-298. 1 fig. 1938.—The effect of burning on ground cover, humus, and forest reproduction was studied on numerous large burned-over areas in e. Norway. The oldest burns studied occurred about 1840, the others since 1900. In the Calluna-Cladonia-Pinus type there was about as much Calluna a few yrs. after burning as on adjacent unburned areas. This must have burning as on adjacent unburned areas. This must have come from seed in the humus. Cladonia silvatica reoccupied the ground quickly, C. alpestris and C. rangiferina much more slowly. In the Calluna-Vaccinium vitis-idaea-Pinus and the V. vitis-idaea-Cladonia-Pinus types, Vaccinium came back quickly, by sprouting. Burning had little direct effect on composition of the humus; ashes provided fertility for a few ways but the effect seen ways off. Burning of the for a few yrs. but the effect soon wore off. Burning of the ground cover resulted in drying out of the humus, which retarded activity of microorganisms. Cessation of the annual addition of decaying vegetation tended to result in an inactive humus with a crusted surface. Almost no burns in the Calluna-Cladonia-Pinus type and only a few in the other types have restocked naturally with pine. Natural reproduction after a fire in the first type requires combina-tion of a good seed yr. with good conditions for germination and survival, before the fertility from the ashes has leached out.—W. N. Sparhawk.

15644. HEİKINHEIMO, OLLI. Metsäpuiden siementämiskyvystä. II. [Seed production of forest trees. II.] [With Ger. summ.] Comm. Inst. Forest. Fenniae 24(4): 1-67. 2 fig. 1937(1938).—A study of forest seed production, on which a report was published in 1932, was continued; this paper presents results for 1932-1936. Seed production was ascertained by setting 1-m.-square boxes or seed-traps, covered with wire screen, in typical forests in several locali-

ties. The spp. studied were pine, spruce, birch, and European and Siberian larch.—W. N. Spurhawk.

15645. HELLINGA, G. De natuurlijke stamafscheiding van den djati (Tectona grandis L.F.). [Natural thinning in teak.] [With Eng. summ.] Tectona 32(4/5): 290-308. 4 fig. 1939.—For 21 unthinned teak sample plots the mean diam. (based on basal area) was only 70-95% of that on normally thinned plots; the number of trees was 50-250% greater and the basal area per ha. 50-100% greater. Total volume was 20-80% greater than the vol. of the remaining stand on thinned plots, but 5-25% less than the total vol. produced on these plots, including wood removed in thinning.-W. N. Sparhawk.

15646. HEYWARD, FRANK. Soil temperatures during forest fires in the longleaf pine region. Jour. Forest. 36(5): torest fires in the longlear pine region. Jour. Forest. 36(5): 478-491. 8 fig. 1938.—During surface fires, soil temp. at depths of \(\frac{1}{2}\)-\frac{1}{2} inch in various fuel types under longleaf pine forests ranged up to a maximum of 270° F. and declined rapidly after 2 to 4 min. Maximum temps, over 200° F, were infrequent. At \(\frac{1}{2}\) inch depth, soil temp. was much lower than at \(\frac{1}{2}\) inch ; at 1 inch depth, only slight increases were recorded during fire. No soil temp. sufficient to char dry organic material in the soil was recorded.—A. G. to char dry organic material in the soil was recorded.—A. G.

HUFNAGEL, LEOPOLD. Des Plenterwaldes 15647. Wirtschaftsziel, Normalbild und Einrichtung. Centralbl. ges. Forstwesen 65(1): 1-15; (2): 50-60; (3) 82-92. 1939.—
The structure and management of the selection forest are discussed, in contrast with forests composed of more or less even-aged stands. Distinguishing characteristics of the selection forest are that the unit of management is the single tree rather than a stand, and that the age of trees or stands is not a governing factor in management as it is with other silvicultural systems. Although a selection forest may be divided into compartments for convenience, no single compartment can be expected to have the normal distrib. of size classes that is essential for the selection forest as a whole. Consequently, a single uniform cutting cycle cannot be established for all compartments; some may be cut over more often than others. Regulation of the cut by various methods is discussed, particularly the Swiss control method and the volume method. The author believes that except in the high mountains where the protective function is important, the selection system should be applied only on good sites with annual precipitation above 900 mm., with

tolerant spp. like fir, with some spruce and beech in mixture. Other forms, such as various forms of shelterwood and group selection, have most of the advantages and few of the disadvantages of the single-tree selection system. W. N. Sparhawk.

15648. HUFNAGEL, LEOPOLD. Das Plenterprinzip in der Weltforstwirtschaft. Zeitschr. Weltforstwirtsch. 6(4): 230-238. 1939.—Selective cutting on an individual-tree-selection basis may be a dimension cutting (strict economic selection) which, if the diam. limit is low enough, may approach clear cutting and so destroy the forest. This can be prevented by adoption of a working plan that regulates

the volume of larger trees to be cut and provides for regeneration of cut-over areas.—W. N. Sparhawk.

15649. IKENBERRY, G. J., H. D. BRUCE, and JOHN R. CURRY. Experiments with chemicals in killing vegetation on firebreaks. Jour. Forest. 36(5): 507-515. 1938.—Formulae, methods of application, and degree of effectiveness are given for herbicides used in the Sierra Nevada and Coast Range forests of northern California. Most effective against sprouting oak stumps were NaClO₃, Na₂AsO₃, and 27° Diesel oil. Four lbs. of Na₂AsO₃ or dry As₂O₃ per sq. rod sterilized soil against grasses and shallow-rooted herbs. NaClO₃ and borax were effective against Chamaebatia foliolosa. A 4:2 admixture of Na₃AsO₃ and NaClO₃ was effective against most vegetation except trees, shrubs, and bracken fern.—A. G. Hall.

15650. ILVESSALO, YRJÖ. Perä-pohjolan luonnon normaalien metsiköiden kasvu ja kehitys. [Growth of natural normal stands in central north Suomi (Finland).] [With Eng. summ.] Comm. Inst. Forest. Fenniae 24(2): 1-168. 6 pl., 40 fig. 1937(1938).—This investigation of the growth and yields of uneven-aged natural forests-mainly pine, with some spruce and birch-applies to an area of about 5,000,000 ha., between latitudes 66° and 68°, almost all north of the Arctic Circle. It is based on intensive measurement of 131 sample plots and 171 complete stem analyses. The investigation covered number of trees, distrib. by diam. classes, basal area, heights, total volume, vol. increment. loss through mortality, total yields, relation of actual to normal yields, and growth of dominant trees. Mortality accounts for a large proportion of the gross increment and practically equals it in old stands. Actual yields average about ½ the normal, for the forest is largely understocked as a result of fires in the past. Growth of pine is much more rapid than that of spruce, and yields of birch (which is so poor that it is of little value except for fuel) are less than those of spruce. Growth is much slower than in S. Finland and trees of a given size require more growing space, hence the stands are more open. Self-thinning is poor in early yrs., leading to overstocking, then at about 70-100 yrs. speeds up and causes a sudden reduction in net increment. Thinnings at this period, or sooner, are indicated. A shelterwood form of management is advocated, with 3-4 thinnings or intermediate cuttings at 10-30 yr. intervals after the 50th yr., and a removal cutting in 2 instalments, the 1st at 90-160 yrs., depending on forest type, and the 2d 20-40 yrs. later, after the reserve trees have seeded up the stand and grown to relatively large size.—W. N. Sparhawk.

15651. JAMES, N. D. G. The planting of tips and slag heaps. Quart. Jour. Forest. 33(3): 164-172. 6 fig. 1939.— Methods are outlined for afforesting waste heaps from collieries, quarries, and soil excavations of various sorts. Spp. suitable for the purpose in England are listed. It is essential to provide some humus and to provide ground vegetation such as broom, gorse, or alder, that will conserve soil moisture.-W. N. Sparhawk.

15652. KALELA, AARNO. Zur Synthese der experimentellen Untersuchungen über Klimarassen der Holzarten. Comm. Inst. Forest. Fenniae. 26(1): 1-445. 1937(1938).— This is a compilation and analysis of all the comparative investigations of climatic races of forest trees that have been carried on in Europe during the last 50 yrs. Important sources of error in such studies have been the failure to consider the effect of age of mother tree and wt. of seed on development of the plants; to realize that 2 or more strains of a given sp., having distinct hereditary characteristics, may grow in the same climatic region; and to give due wt. to differences in the planting methods and other

conditions of the expt. itself. In many of the investigations inadequate data were available on the climate of the place of origin of the stock under investigation. The author attempts to correct this deficiency. The report covers work on Pinus silvestris, P. contorta, Picea excelsa (P. abies), P. on that sections. P. engelmann, Abies pectinata (A. alba), Pseudotsuga taxifolia, Tsuga heterophylla, Larix europaea, L. kurilensis, L. dahurica, Fagus silvatica, Quercus robur, Acer pseudoplatanus, and Fraxinus excelsior. Practically all of the investigations have shown consistent results. There appear to be no sharp dividing lines between different climatic pear to be no snarp at viding lines between different chimagor races of any sp., but there are gradations between them. 14-p. bibliography.—W. N. Sparhawk.

15653. KALNINS, ARV., and ROB. LIEPINS. Techni-

cal properties of Latvian coniferous timber (Pinus silvestris L, Picea excelsa Lk. and Larix europaea D.C.) with relation to conditions of growth. Latvijas Mežu Petišanas Stacijas Raksti 10. 1-82. Map, 32 fig. 1938.—Pine and spruce grow under optimum climatic conditions in Latvia, and produce better av. timber than the same trees growing under less favorable conditions. A study of the mechanicaltechnical properties of pine was based on 12,000 specimens, carefully chosen and with records of the growing conditions of each. There is wide variation in the wood properties, in many instances related to the conditions under which the trees grew, but also dependent on the part of the tree from which the sample comes. For spruce the variation is within narrower limits. The results of numerous tests on pine and spruce, in an attempt to correlate properties with various factors, are presented. The results of testing about 700 samples of larch wood (mostly L. europaea, with some L. sibirica) are also given. Larch occupies only 232 ha. in Latvian forests. Preservative treatment of pine and spruce wood, particularly for poles and posts, by the osmosis method and by inducing "resinification" of the sapwood of standing trees, is descr. This last process consists of gradual removal of the bark on the lower part of the trunk, during several summers before the tree is cut. With spruce, resin formation in several outer annual rings has been greatly stimulated by application of chemicals to fresh wounds where the bark is removed.—W. N. Sparhawk.

15654. KANGAS, ESKO. Tutkimuksia mäntytaimisto-

tuhoista ja niiden merkitysestä. [Investigations on damages to pine plantations.] [With Ger. summ.] Comm. Inst. Forest. Fenniae 24(1): 1-304. Map, 10 pl. 1937(1938).—
The various forms of damage (by insects, fungi, birds, mammals, mechanical injury) to established pine plantations (5-30 yrs. old), especially on old burns, in N. and S. Finland were studied. On numerous sample plots all of the trees and their condition were recorded, with notation of the nature and seriousness of injury, if any. Also, intensive studies were made of the roots, and of the reaction of individual plants to certain injuries over several yrs. The injuries were classified according to the part of the plant injured. The character and seriousness of damage by each agency is descr. in general, and the conditions on each area investigated are descr. in detail. The number of harmful agencies and the extent of injury are especially great on extensive old burns, restocked with practically gure pine. The larger the area the worse the injury. Naturally reproduced areas suffer less than plantations. Insect injuries predominate in S. Finland, and the number of harmful spp. is greater there than in the N. Most of the damage in the N. is done by fungi. The worst insect pests are Pissodes, Evetria, Luperus, Hylobius, Lachnus, and Blastophagus spp., Cacoecia piceana, Heringia dodecella, Cryptocephalus pini, and Melolontha hippocastani. Occasionally, Magdalis, Diprion, Acantholyda spp. and Dioryctria mutatella cause serious injury. The worst fungi are Lophodermium, Dasyscypha, Phacidium, Melampsora, Hypodermella sulcigena, and Armillaria mellea. Plantations usually are not seriously injured until they reach a "critical" age (in S. Finland 8-12 yrs.), and the worst damage is generally past by the end of the 20th yr. These ages vary with locality and the spp. of injurious insects or fungi. On many areas of upland pine burns repeated planting has failed to establish a forest stand, owing to the heavy mortality from these numerous destructive agencies. 9-p. bibliography.—W. N. Sparhawk. 15655. KNUCHEL, H. Der Einfluss der Fällzeit auf die Eigenschaften des Buchenholzes (Nachtrag). Schweiz.

Zeitschr. Forstw. 90(5): 158-164. 5 fig. 1939.—834 boards (cut with vertical, flat, and diagonal grain) from a large number of 100-120-yr.-old beech trees felled at intervals between Jan. and Dec., 1933, were examined in Sept. 1935 and Apr. 1937 for moisture content and extent of drying and shrinkage. Under similar drying conditions there was no significant difference in the rate of drying of wood felled at different seasons, nor was there any difference in checking and warping beyond that attributable to individual tree variation. For wood dried in the open air, however, drying conditions at different seasons are not the same.—W. N. Sparhawk.

15656. KOEHLER, ARTHUR. Rapid growth hazards usefulness of southern pine. Jour. Forest. 36(2): 153-158. 4 fig. 1938.—Maximum longitudinal shrinkage of oven-dried, rapidly-grown, loblolly pine and slash pine wood was 2%, or 17 times normal wood shrinkage. Generally, specimens having less than 3½ rings per in shrank more than 0.25%. Low density and low strength-weight ratios also were found. A. G. Hall.

15659. LUKKALA, O. J. Nälkävuosien suonkuivausten tuloksia. [Results of moor drainage during the famine years.] [With Ger. summ.] Comm. Inst. Forest. Fenniae 24(3): 1-160. 8 pl., 40 fig. 1937(1938).—Large areas of swamp land in Finland were drained in the last part of the 19th century, particularly during the famine period of the 1860's, to increase the agricultural area and to give jobs to unemployed. Much of the drained land was left in forest. The rate of timber growth was markedly increased by drainage, and forest cover grew up on some of the hitherto unforested swamps. The effect of the drainage on soil vegetation, forest growth, and decomposition of the peat was investigated in 1934, by means of sample plots and individual tree measurements, in 13 localities in S. Finland. Diam. growth of trees began to increase a few yrs. after draining, and continued to increase to a peak in 15-20 yrs., after which it decreased unless the ditches were kept open. Growth was best near the ditches. On intensively drained areas ground vegetation similar to that on upland soils came in during the course of several decades, even on a peat subsoil. To get best results from drainage, ditches must be kept open, and must be fairly close together.—W. N. Sparhawk.

15660. MACKINNEY, A. L., and C. F. KORSTIAN.
Loblolly pine seed dispersal. Jour. Forest. 36(5): 465-468.
2 fig. 1938.—Seed fall from a fully stocked, 70 yr. old loblolly pine stand in eastern North Carolina during 1936-37 started on Oct. 14 and continued until June 23. Maximum fall occurred during the week of Nov. 18. Total seed fall

was heaviest under the uncut stand and progressively less in clear-cut leeward strips. Viability was greatest for the seed earliest to fall.—A. G. Hall.

15661. MARTINEZ, JOSE GARCIA. La explotacion de los pinos en Mexico. Bol. Dept. Forest. y Caza y Pesca [Mexico] 4(12): 183-229. Map. 1938.—There are 26 spp. of Pinus in Mexico. Pine forests occur in 23 of the States. The total pine area is almost 2,000,000 ha. The timber stand is estimated at 430,000,000 cu.m., the potential annual cut at 14,300,000 cu.m., and the actual cut (1935) about 1,800,000 cu.m.—W. N. Sparhawk.

15662. MEGINNIS, H. G. Effect of depth of sowing on

nursery yields of black locust. Jour. Forest. 36(4): 411-416. 1 fig. 1938.—Seedling yields of black locust seed sown at depths of 2, 1, ½, and ½ inch, were 0.92% 7.1%, 10%, and 7.84%, respectively. Shallow sowing gave significantly higher results than did deep sowing in both heavy and light soils. For nursery practice, where soil moisture can be regulated during the germination period, sowing at depths of 4-½ inch is recommended.—A. G. Hall.

15663. METZGER, O. F. Forstwirtschaftliche Aufgaben in unseren Kolonien. Forstwiss. Centralbl. 61(7): 193-211. 1939.—A brief discussion of the forests of the former German colonies in Africa, and the major forestry problems. Timber utilization is the most pressing problem; it should be done by governmental agencies rather than under concession, in order to insure perpetuation of the resource. Investigation of known and potential by-products—fruits latex, fibers, barks, resins, dyes, drugs—is also on important problem. The 3d problem is the conservation of forest cover for its influence on climate and soil. The 4th is afforestation of steppe lands.—W. N. Sparhawk. 15664. MEYER, KARL ALFONS. Holzartenwechsel und frühere Verbreitung der Eiche in der Westschweiz. Mitteil. Schweiz. Anst. Forst. Versuchswesen 20(2): 445-511. 4 fig. 1938.—The changes in forest composition in the Bernese Jura are traced from old records of the bishopric of Basel and other documents, and from place names. The forests were destroyed or depleted of valuable timber by the highly developed iron and glass industries, by extraction of resin (spruce), by pasturage, by cutting for export, and by cutting for naval and military use, especially during the Napoleonic period. Light-demanding spp. such as Pinus silvestris and Quercus pedunculata constitute a much smaller part of the forest than they once did; fir has decreased in some places and increased in others; and spruce probably occupies considerably more ground than it did a few centuries ago.—W. N. Sparhawk.

15665. MILLAR, J. B. Spruce regeneration in northern Ontario. Forest. Chron. 15(2): 93-96. 1939.—The best black

Ontario. Forest. Chron. 15(2): 93-96. 1939.—The best black spruce pulpwood stands in no. Ontario are on old burns. The swamps, spruce flats, and muskegs invariably regenerate to spruce following a fire; higher, well-drained land regenerates to a mixture of black spruce with aspen, white birch, and white spruce. Spruce seed comes from standing, fire-killed trees; burns on land from which all spruce of seed-bearing size has been cut, or on land stocked only with young spruce, do not reproduce to spruce. On unburned, clear-cut areas, where all spruce and balsam down to a 5-inch stump has been cut, reproduction is fairly good, although the proportion of balsam tends to increase.—W. N. Sparhawk.

15666. MORK, ELIAS. Omsetningen i humusdekket ved forskjellig temperatur og fuktighet. [Decomposition in the humus layer at various temperatures and degrees of moisture.] [With Eng. summ.] Meddelel. Norske Skogsforsøksvesen 6(2): 179-224. 12 fig. 1938.—The effect of temp. and moisture on the formation of ammonia and nitrate and on the evolution of CO2 was studied in the laboratory, for 4 types of humus. Decomp. of N in the humus was highly dependent on both factors. Formation of ammonia increased with rising temp. from 10° to 30° C, but when stored longer than 12 wks. the max. was at 25°. At temps. of 10°-15° with a moisture range of 20-75% by vol., the degree of moisture had slight effect; at 20°-25° a 55% moisture was best. The optimum temp. for formation of nitrate in the forest humus studied was about 20°; at 30° there was no nitrification. Moisture had greater influence on the formation of nitrate than of ammonia; 55% was the most favorable moisture. A difference of 5° in storage temp. between 20° and 25° may cause a change of 1.0 in pH value. In easily nitrified humus the evolution of CO2 increased with temp. from 10° to 30°, through a storage period of 16 wks. In less easily nitrified humus the evolution of CO2 at 30° decreased after a few wks. and in 9 wks. was less than at 20°. With raw humus it was less after 5 wks. storage at 25°-30° than at 20°. A moisture range of 40-75% did not affect CO2 evolution when stored at 10°, but 75% moisture checked it at 20°. Moisture as low as 30% restricted evolution of CO2 at both 10° and 20°.—W. N. Sparhawk.

15667. MORK, ELIAS. Gran- og furufrøets spiring ved forskjellig temperatur og fuktighet. [Germination of spruce and pine seed at various temperatures and degrees of moisture.] [With Eng. summ.] Meddelel. Norske Skogsforsøksvesen 6(2): 225-249. 6 fig. 1938.—Germination tests were run at 10°, 15°, and 20°C and with 20, 35, 50, and 70% moisture by vol. in the germinating medium (finely crumbled humus). After 60 days, temps. in all lots were raised to 20° and the moisture of the 2 drier lots to 40%. Highest temp. than ripe seed; about 50% of the latter germ. at 10° within 5 wks., but none of the poorly ripened seed germ. at 10°. The moisture optimum was between 35 and 50%. In soil with temp. too low for good germ., the time required became longer as temp. decreased, and most of the seed died, especially when the soil was moist. Poorly ripened pine seed retained its germ. capacity better than spruce, when moisture did not exceed 50%. Tests prove the superiority of well-ripened seed, both for its germ. capacity and for its ability to remain viable in the soil when germ. conditions are unfavorable.—W. N. Sparhawk.

15668. OUDIN, A. Étude sur le gemmage des pins en France. Ann. École Nation. Eaux et Forêts et Sta. Rech. et Expér. [Nancy] 7(1): 167-291. Map. 6 pl. 1938.—The influence of various factors, such as age and size of tree, number of faces per tree, orientation of the face, size and age of face, number of chippings per season, insolation, distance from the ocean, and thinning, on the production of gum from Pinus pinaster (P. maritima), P. halepensis, and in less detail from P. silvestris and P. laricio (v. corsicana and v. nigra) was studied. The effect of working on timber quality, and the composition of the gum from each sp. were also investigated, as was also the use of various techniques other than the usual Hugues method. The av. annual yield per face for P. pinaster is about 2 liters. Unworked trees exceed tapped trees by 10-20% in height and diam. The Hugues method generally gives best results; the principal improvement suggested is to cover the cup (pot) so as to keep out foreign matter and reduce evap. Costs of production can be materially reduced by widening the faces from 9 to 10 cm., by shortening the working season about 6 weeks (to Apr. I-Oct. 15), and by working a face 3 yrs. instead of 4 (to the same height as under present practice). Selective breeding of high-yielding individuals appears to offer some promise.—W. N. Sparhawk.

15669. OUDIN, A. Les amendements et engrais dans les reboisements. Rev. Eaux et Forêts 77(4): 335-341. 1939.

A brief discussion of the use of chemical fertilizers in forest nurseries and plantations. The author concludes that such fertilizers can be used to good advantage in spite of the cost in many plantations. W. N. Seets of the

such fertilizers can be used to good advantage in spite of the cost, in many plantations.—W. N. Sparhawk.

15670. PARENTE, ETTORE. Note sulla concimazione nei vivai forestali. [Note on use of fertilizers in forest nurseries.] Riv. Forest. Ital. 1(5): 332-336. 2 fig. 1939.— Suggestions for storage and use of stable manure in forest nurseries.

15671. PARRAS, VICENTE. Comparison of different methods of germinating bitaog. Philippine Jour. Forest. 2 (1): 57-63. 1 pl. 1939.—The seed of Calophyllum inophyllum has a thick, hard coat and requires 2-4 months for germination. The possibility of hastening germination by cracking the seed and by removing its outer shell was investigated in 3 series of tests. Germ. of completely shelled seed commenced in an av. of 22 days (57 days for untreated control) and lasted for 38.66 days (52.66 days for control); the germ. % was 93.1 (63% for the control). Mere cracking of the shell hastened the start of germ. to a less extent, but germ. was completed only about 1 day sooner than that of the control and the final germ. % was only 75.5. Untreated seed covered with mulch was the last to complete germ, but 81.5% germinated.—W. N. Sparhawk.

but 81.5% germinated.—W. N. Sparhawk.

15672. PERRIN, H. Sur l'accroissement des chênes de taillis sous futaie. Rev. Eaux et Forêts 77(4): 293-305. 3 fig. 1939.—The coppice-with-standards form of forest is especially well adapted for growing large oak timber. As the rate of growth of individual trees varies greatly, it is important to select the reserves carefully. Numerous measurements have shown that in n.e. France (Saône basin) the graph for av. growth in circumference of reserve trees follows a straight line, from the sapling stage to the largest sizes reached by the sp. on the given site. These reserve trees may be classified into several groups, on the basis of periodic circumference (or diam.) growth. Those of most rapid growth (60 cm. circumference in 25 yrs.) are in the elite class and should be left (on medium and good sites) until they are 150 yrs. old. Not only does the vol. increase at a satisfactory rate, but the value per cu.m. increases in direct ratio with the diam. of the tree. It is not profitable to grow large oak timber on poor soils.—W. N. Sparhawk.

15673. PETCUT, M. Vitalitatea rădăcinilor de stejar. [Vitality of oak roots.] [With Fr. summ.] Rev. Pădurilor [Bucharest] 51(2): 135-149. 9 fig. 1939.—Stumps covered with earth remain alive for a long time, even when the earth is dry and compact. Sprouts eventually develop from the root collar—an instance is cited of such a sprout appearing on a tree cut 22 yrs. before. Creation of favorable conditions by loosening the soil around secondary roots leads to the formation of suckers. These have been observed in heavily pastured areas, in young coppice, in naturally seeded areas, and even in nurseries.—W. N. Sparhawk.

15674. RAYNER, M. C. The mycorrhizal habit in relation to forestry. III. Organic composts and the growth of young trees. Forestry 13(1): 19-35. 4 pl. 1939.—An account

of expts. designed to test the conclusion that the stimulating effects on growth of seedling conifers observed to follow the application of organic composts "differs essentially from that of ordinary manures." Pot expts. were grown in series supplied respectively with composts and with the equivalent amts, of lime, available N, K₂O, and P₂O₅ contained in them, calculated from the results of Mitcherlich expts, with oats. Results are expressed in a table showing final dry weights, and by photographs of the exptl. plants. They prove that increase in the supply of available nutrients plays an insignificant rôle in the maintenance of healthy and vigorous growth, confirm previous conclusions respecting the presence of actively deleterious substances in the exptl. soil, and show that addition of composts puts an end to their production whereas that of equivalent inorganic salts is practically without effect. The bearing of these results on the hypothesis of compost action previously put forward is discussed.—M. C. Rayner.

15675. SAUSSENTHALER, H. Theoretisches und Praktisches über Ertragstafeln und über Ertragsregelung in schlagweisen Hochwald. Zeitschr. Forst- u. Jagdw. 70(3): 121-149; (4): 194-210. 9 fig. 1938.—The cut in high-forest can be regulated on the basis of area and volume with stem and branchwood and final and intermediate cuts kept separate. Control of the intermediate cut is necessary where intensive thinning is done, for more than 40% of the total normal increment is removed in thinnings. A yield table for spruce is developed which shows, for several sites and at 5-yr. intervals from 20-120 yrs. ages, the intermediate cuts and the remaining stand. Method of preparing such tables with a minimum of time and expense, by the use of increment borings, is outlined.—W. N. Sparhawk.

15676. SCHAEFFER, LEON. La méthode du contrôle et l'evolution du jardinage. Rev. Eaux et Forêts 77(5): 389-402. 2 fig. 1939.—In a forest managed by the selection system cutting should be repeated every 5-8 yrs. (up to 10 yrs. for broadleaf forest) and should never remove more than 25% of the vol. of timber at any one time. Experience in a forest managed by this method for 30 yrs. shows that increment can be determined with reasonable accuracy by the method of periodic inventories. There was close correlation between increment and precipitation for 5-yr. This variation with meteorological and probably also with other factors makes it difficult if not impossible to stabilize the growing stock in a selection forest at an optimum vol., as Gurnaud had hoped to do.-W. N. Sparhawk.

15677. SCHIMITSCHEK, ERWIN. Untersuchungen über Rotwildschälschäden und deren Folgen. (I. Untersuchung geschälter Fichtenbestände im Gebiete des n.-ö. Ostalpenrandes.) Centralbl. ges. Forstwesen 65(2): 33-50; (3): 65-82; (4): 97-121. 49 fig. 1939.—This is a discussion of the extent and character of damage to spruce stands on limestone soils in the eastern Alps, at altitudes of 650-850 m., as a result of peeling by red deer. The age of stand subject to damage depends on character of the bark, degree of slope, and depth of winter snow (with steep slopes or deep snow deer can reach higher on the stem, where the bark is smooth). Most of the peeling is done Jan.-Apr. Most peeled stems were infected with red rot, many were broken by wind, and they were commonly attacked by bark beetles and borers. Length of rotten part of the stem was greater on good than on poor sites. Curves and tables show the

extent of decay, both in length and in volume; and the loss of growth after peeling. The better the site, the greater was the % of loss in the butt log.—W. N. Sparhawk. 15678. SERRE, M. de la. Technique des boisements de pins dans ouest de la France. Rev. Eaux et Forêts 77(4): 325-334. 1939.—Methods of establishing pine forests on acid sandy soils in Normandy are descr.—W. N. Sparhawk.

15679. SOSA, ANTONIO H. Exploracion forestal en la ruta Matachic-Mesa del Correo, Estado de Chihuahua. [Forest exploration between Matachic and Mesa del Correo, Chihuahua.] Bol. Dept. Forest. y Caza y Pesca [Mexico] 4(12): 233-260. 14 fig. 1938.—The forests of this part of western Chihuahua consist largely of Pinus ponderosa, with a few other pines, juniper, oaks, and other spp. They have been seriously abused and are deteriorating, especially as a result of girdling by the Indians.—W. N. Sparhawk.

15680. SWART, F. Begroeiing en reboisatie van het Wilisgebergte in de afdeeling Kediri. [Vegetation and afforestation of the Wilis Mountain in the Kediri Division

(Java).] [With Ger. summ.] Tectona 32(6): 469-508. 2 maps, 7 pl., 1 fig. 1939.—This mountain, the highest peak of which reaches 2,392 m., is the remnant of a group of volcanoes. The s. and s.e. slopes, having a moist local climate, are forested, as are some of the valleys on the other slopes. The summits and side ridges and the n. and n.e. slopes are drier and covered with a "fire vegetation," the result of repeated burning since prehistoric times. At the higher elevations this vegetation consists of various grasses with a thin stand of Casuarina junghuhniana. Some forest areas have a thin overstory of this tree, which indicates that the area subject to burning has decreased. Where burning has been stopped the forest is spreading naturally; since 1923 considerable areas have also been planted.— $W.\ N.$ Sparhawk.

15681. VACHAT, FRANÇOIS du. Les boisements en peuplier dans les marais de la Chautagne. Rev. Eaux et Forêts 77(4): 306-317; (5): 403-413. 7 pl. 1939.—This unproductive marsh in the Rhone valley has been taken over and is being afforested by the State, with poplars. Before planting, drainage ditches were built to lower the water level. Only nursery-grown rooted planting stock is used, generally 3-4-yr. old saplings of 7-10 cm. diam. at 1.3 m. above the roots and 3-4 m. long. The trees are spaced 4 m. apart in rows 5 m. apart, running from N. to S. They are planted on mounds, in winter (Nov.-Mar.). Methods of caring for the plantations and protecting them from fungi are outlined. A yield of 750 cu.m. of usable wood can be expected in 30 yrs. Growth has been 20-40% greater where Alhus glutinosa was planted between the rows than where it was not used.—W. N. Sparhawk.

15682. WECK. Kahlschlaglose Wirtschaft in Kiefern-revier. Mitteil. Forstwirtsch. u. Forstwiss. 9(2): 242-252. 1938.—Dauerwald management does not necessarily mean any particular silvicultural system, such as the selection system. For the n. German pine region it means reproduction, preferably by natural means, in advance of the final cut through gradual opening of the old stand by thinnings and regeneration cuttings. The degree of thinning has less influence on total vol. yields than the careful selection of the individual trees cut at each operation. In 120 yrs. a pine stand on sites II and III, from which 60% of the total yield has been removed in thinnings, will yield as much merchantable timber (Derbholz) as stands thinned lightly. The best pine grown in Germany (Taberbrück pine of E. Prussia) started and grew up in the shade of the old stand throughout the period of rapid height growth. So far as known, none of the highest quality pine was grown on clear-cut areas. Clear cutting has been prevalent in n. and e. Germany because of lack of markets for the small timber that would result from cuttings during the early life of the stands, and the large administrative units that made intensive management difficult. For Eberswalde, Weck plans to use an irregular group shelterwood method, with artificial reproduction of pine where needed to supplement natural regeneration. To produce the best sawlogs the trees will have to stand 140-200 yrs.; probably 140 yrs, will suffice where it is possible to produce clear stems by pruning, instead of waiting for natural pruning in dense stands. In the older pine stands young growth should be introduced between 110 and 140 yrs., for the stands tend to open up as a result of fungus attack after 110 yrs.—W. N. Sparhawk.

15683. ZEDNIK, FRIEDRICH. Über der Aufbau des Urwaldes der gemässigten Zone. Zeitschr. Weltforstwirtsch., 6(4): 215-229. 5 pl. 1939.—There are 2 schools of thought on the typical composition and structure of a virgin forest: one, that it represents a plant community in perpetual balance, with all age-classes and continual mortality and regeneration, the typical selection forest; the other, that it represents a continuous cycle (youth, maturity, old age) of development, with typically even-aged stands over large areas. Both are right; a virgin forest of shade-tolerant trees generally follows the 1st pattern, one of light-demanding trees the 2d. There are various transitional stages, as where tolerant spp. come in as even-aged understory beneath intolerant spp. and gradually crowd them out. Virgin forests composed exclusively of light-demanding trees can exist only in localities where there are no tolerant spp., for if such are present they will seed in and eventually crowd out most of the intolerant trees.—W. N. Sparhawk.

PHARMACOGNOSY AND PHARMACEUTICAL BOTANY

HEBER W. YOUNGKEN, Editor

(See also in this issue Entries 15092, 15849)

15684. BRAY, M. W., J. S. MARTIN, and L. H. SMITH. List of references to the literature on tall oil (tallol, liquid rosin, pine oil, or black liquor soap). U. S. Dept. Agric. Forest Serv. Forest Prod. Lab. 9p. 1938.—This list contains 98 references, mostly to foreign publications, of which a considerable number report Swedish work on this material. A brief account is appended of the manufacture, constituents, purification, and uses of liquid rosin or tall oil (Swedish "tall" equals pine)—Courtesy Ern Sta Rec

A brief account is appended of the manufacture, constituents, purification, and uses of liquid rosin or tall oil (Swedish "tall" equals pine).—Courtesy Exp. Sta. Rec.

15685. BROCKMANN, HANS, und KARL MAIER. Über das Rottlerin. Liebig's Ann. Chem. 535(2): 149-175. 3 fig. 1938.—Rottlerin, the pigment of Kamala, is formed in glands of the fruit-epidermis of Mallotus philippinensis (=Rottlera tinctoria Roxb., Euphorbiaceae). The article deals with (1) rottlerin, (2) its derivatives, (3) iso-rottlerin (4) decomposition expts and (5) configuration.—M. Newhot.

(4) decomposition expts. and (5) configuration.—M. Neuhof.

15686. CHABRE, PAUL. Les huiles de foie de morue. Leur teneur en vitamines A et D. With preface by ANDRÉ CHEVALLIER. 207p. Illus. Mason et Cie: Paris, 1936.—Part I discusses the therapeutics, general results and economic values; Part II discusses the species of fish (with illustrations) furnishing liver oil, the location of fishing areas (with maps), and the process and the apparatus used in fishing; Part III treats of the preparation of the oil, its extraction, purification, refining and storage; Part IV deals with the chemical constitution of the oil, and vitamin A and D content; and Part V gives a comparison of French with foreign oils, the influence of the place where the fish are caught on vitamin content, and the influence of the physiologic condition of the fish. An appendix includes the requirements for cod liver oil as set up by the French. Japanese, Swiss, Italian, Belgian, English and the United States Pharmacopoeias. The book is well written, interesting, instructive and carries a stimulating cosmopolitan atmosphere.—H. A. McGuigan.

15687. HESSE, GERHARD, FRANZ REICHENEDER, und HANS EYSENBACH. Die Herzgifte im Calotropis—Milchasft. 2. Über afrikanische Pfeilgifte. Liebig's Ann. Chem. 537(1): 67-86. 1 fig. 1938.—The heart poison calotropin could be isolated from the dried leaves and stems of Calotropis procera (Asclepiadaceae). The latex of C. procera

15687. HESSE, GERHARD, FRANZ REICHENEDER, und HANS EYSENBACH. Die Herzgifte im Calotropis—Milchsaft. 2. Über afrikanische Pfeilgifte. Liebig's Ann. Chem. 537(1): 67-86. 1 fig. 1938.—The heart poison calotropin could be isolated from the dried leaves and stems of Calotropis procera (Asclepiadaceae). The latex of C. procera did not yield any calotropin, but contains the 3 following poisons: 1) Uscharin (C₂₁H₂₄O₃).—lethal dose; 0.5γ per g. body wt. (frog); it gives off S and N₂ easily, leaving the residue uscharidin (C₂₂H₂₄O₃). Uscharidin and calotropin are derivatives of the same basic substance. 2) Calotoxin (C₂₂H₂₄O₁₀) whose yield amounts only to ½ of the uscharin. It is a poison that affects especially the heart and causes death at 0.7γ per g. of body wt. frog. 3) Calactin could not be found with the same regularity as uscharin and calotoxin. It is possible that it is formed later on through fermentation processes.—M. Neuhof.

15688. ISHIHARA, TOKUHARU. Über den systema-

15688. ISHIHARA, TOKUHARU. Über den systematischen Abbau der Chenodesoxycholsäure. Jour. Biochem. [Tokyo] 27(2): 265-277. 8 fig. 1938.
15689. JOHN, W., E. DIETZEL, und W. EMTE. Über

15689. JOHN, W., E. DIETZEL, und W. EMTE. Über einige Oxydationsprodukte der Tokopherole und analoger einfacher Modellkörper. 6. Über Antisterilitätsfaktoren (Vitamin E). Hoppe-Seyler's Zeitschr. physiol. Chem. 257 (5/6): 173-189. 3 fig. 1939.—The u.-v. absorption spectra of similarly substituted oxy-chromanes and oxy-cumaranes show only slight differences which are insufficient for differentiation. The shift of the maxima of the u.-v. absorption curves of the esters is large enough for differentiation. The oxidation and reduction expts. with tocopherols show an easily reversible relation only between the quinone- and hydroquinone-stage. A vitamin-E effect was noted only with a-tocopherol-quinone.—M. Neuhof.

15690. KAY, LILIAN A. The microscopical study of drugs. viii+228p. 47 pl., 10 fig. Williams and Wilkins Co.: Baltimore, 1939. Pr. \$4.—This practical laboratory handbook for the microscopical examination of medicinal plants used as drugs is designed for a year's course of 2 3-hour

periods per week. It includes the drugs included in the syllabus for the examinations in the Univ. of London for Pharmaceutical Chemist, and Chemist and Druggist. The text includes the commonest adulterants of drugs and sections on filtering media, fibers, and fabrics. There are 40 major schedules with technical directions, and, for each plant, a summary of diagnostic microscopical characters, as well as appendices on respents and surgical dressings—C. 4 Kofold

summary of diagnostic interescopical characters, as well as appendices on reagents and surgical dressings.—C. A. Kofoid. 15591. KITASATO, ZENJIRO. Über die Konstitution der sauren Sapogenine. XIV. Über Hederagenin und Oleanolsaure. Acta Phytochimica [Tokyo] 10(2): 239-258. 1938.—From the analysis of many derivs. and detn. of previously unknown radicals K. proposes the following formulas for these 2 substances (R'=Me in oleanolic acid and CH₂OH in hederagenin; R=CO₂H or Me):

—E. D. Walter. 15692. OYAMADA, TAICHIRO. Über die Konstitution des Fustins. Liebig's Ann. Chem. 538(1): 44-67. 3 fig. 1939. —Structure of fustine prepared from the wood of Rhus succedanea L.—M. Neuhof.

15693. RATNAGIRISWARAN, A. N., and K. VENKATA-CHALAM. The phytochemistry of the bark of Tabernae-montana coronaria Br. Quart. Jour. Pharm. and Pharmacol. 12(2): 174-181. 1939.—Two alkaloids, tabernaemontanine and coronarine, were isolated in the pure state. Microanalyses indicated the formula C₂₀H₂₀N₂O₃ for tabernaemontanine and C₄₄H₅₀N₄O₅ for coronarine. Preliminary expts. showed that the alkaloids are pharmaeologically active bodies. The nature of this action is not described.—H. A. McGuigan.

15694. REIHLEN, HANS, LUDWIG KNÖPFLE, und WOLFGANG SAPPER. Konfigurative Beziehungen zwischen aromatischen und aliphatischen Aminen. Liebig's Ann. Chem. 534(2/3): 247-275. 3 fig. 1938.

15695. SCHØNHEYDER, FRITZ. The biological assay of extract of male fern. Quart. Jour. Pharm. and Pharmacol. 12(1): 75-81. 1939.—Using about 1000 earthworms the author detd. a characteristic curve showing the relation between doses of extract and mortality. The principles of the assay are outlined and in some instances the detns. of extracts are given.—H. A. McGuigan.

15696. THOMEN, L. F. The latex of Ficus trees and derivatives as anthelmintics. Historical account. Amer. Jour. Trop. Med. 19(4): 409-418. 1939.—A critical account of the clinical and pharmacological studies on the anthelmintic properties of the latex of trees of the genus Ficus is presented, with special reference to F. doliaria in Brazil and F. glabrata (syn. F. laurifolia) in northern South America and Central America. Evidence is presented that the special properties of the latex of F. glabrata (leche de higuerón) for the eradication of the human whipworm, Trichocephalus trichiurus, have been known for more than a century and a half. Recent studies on the effective principle of the latex ficin, indicate that it is a thermolabile enzyme which has an anthelmintic efficiency several fold greater than the crude latex.—E. C. Faust.

PLANT PHYSIOLOGY, BIOCHEMISTRY, AND BIOPHYSICS

F. E. DENNY, Editor

(See also in this issue Entries 14439, 14456, 14463, 14989, 15414, 15420, 15421, 15424, 15442, 15528, 15532, 15537, 15539, 15542, 15543, 15560, 15566, 15569, 15572, 15584, 15601, 15607, 15640, 15817, 15836, 15837, 15840, 15849, 15852, 15862, 15873, 15882, 15933)

ABSORPTION, NUTRITION

15697. COMBONI, SILVIA. Osservazioni anatomichi su plantule di Pisum sativum coltivate in deficienza di potassio. [Anatomical observations on the seedling of Pisum sativum grown under conditions of potassium deficiency.] Nuovo Gior. Bot. Ital. 46(1): 126-140. 5 fig. 1939.—Peas were grown in complete nutrient solns, solns, with ½ the usual amt. of K, and solns, with no K. Deficiency of K results in slender shortened stems and leaves that are few and small and often spotted with necrotic areas. The vascular cylinder of the stem is reduced, the vessels being few and small; phloem fails in complete differentiation; parenchyma becomes abundant.—F. Ramaley.

15698. KETCHUM, BOSTWICK H. The development and restoration of deficiencies in the phosphorus and nitrogen composition of unicellular plants. Jour. Cell. and Comp. Physiol. 13(3): 373-381. 1939.—When the marine diatom, Nitzschia closterium is grown in the light in a medium containing no phosphate, cells deficient in P are formed. These cells absorb added phosphate rapidly even in the dark. No cell division occurs in unilluminated cultures and the absorption of phosphate is complete in about 10 hrs. The amt. of phosphate absorbed is independent of the conc. of phosphate in the medium, and is directly related to the length of time the cells have been grown in the light in a phosphate-deficient medium. The amt. absorbed per cell in the dark is a direct measure of the deficiency to which the cells have been subjected, and is called the phosphate or P debt. The precursors of the organic compounds of P can apparently be formed in the light even when no phosphate is available for absorption. In illuminated cultures an equal amt. of phosphate is absorbed for every cell formed. Apparently the phosphate absorbed by illuminated cultures also combines with some constituent of the cell.—Chlorella pyrenoidosa can develop deficiencies for both N and P, which can be satisfied by the absorption of phosphate and nitrate either in the dark or in the light. The deficient cells may contain as little as 20% of the normal P content and 35% of the normal N content.—Auth. (courtesy Wistar Bibl. Serv.).

15699. MULLISON, WENDELL R. Effect of calcium deficiency on respiration of etiolated seedlings. Bot. Gaz. 100(4): 828-835. 1939.—Roots of pea and corn respired more than twice as much as did their tops. The respiration of the tops and roots of the squash seedlings was about the same due to the fact that the squash cotyledons were above ground. Total respiration of the plants given nutrient soln. lacking Ca was in every case less than that of the plants given complete nutrient soln. Lack of Ca was most noticeable in the greatly lowered respiration of the tops on —Ca nutrition as compared with that of the tops on complete nutrients.—W. R. Mullison.

15700. PETRIE, A. H. K., RUTH WATSON, and E. DOROTHY WARD. Physiological ontogeny in the tobacco plant. 1. The drifts in dry weight and leaf area in relation to phosphorus supply and topping. Australian Jour. Exp. Biol. and Med. Sci. 17(2): 93-122. 16 fig. 1939.—The dry wts. of all parts of the plant (Nicotiana tabacum) are increased by increasing the P supply to an optimum and depressed by excess P supply. There is evidence that P deficiency, and also excess P supply, resulted in delayed development of the axis. Topping caused increase in dry wt. of the whole plant, and particularly of the roots and the leaves. The increased leaf and root growth tended to be the counterpart of the inflorescence development in the untopped plants. In the lower leaves maximum dry weight had been attained at about the time of topping; this operation therefore resulted only in a less rapid decline in dry weight during senescence. The upper leaves had not attained their maximum dry weight at the time of topping, and in these the operation resulted in more rapid subsequent increase in dry weight and delayed maximum. Increasing P

supply to the optimum produced more marked increase in area than in dry weight of leaves. The maximum area was attained earlier than the maximum dry weight. Leaf area was increased by topping but to a much less extent than the dry weight. Data for relative growth rate, unit leaf rate, and leaf weight and area ratios are presented and discussed. Consideration is finally given to the significance of the inflorescence as a determinant of the ontogeny of other organs.—Auth. summ.

15701. STEWARD, F. C., and J. A. HARRISON. The absorption and accumulation of salts by living plant cells. IX. The absorption of rubidium bromide by potato discs. Ann. Botany 3(10): 427-453. 1939.—A spectrographic technique for the determination of rubidium in plant extracts is fully described. Flame spectra were used and the combustion apparatus devised for the purpose is applicable to the quantitative determination of other alkali metals. The absorption of rubidium and bromide by standard potato discs from solutions of rubidium bromide—as effected by oxygen supply, time, and the specific surface of the discs—was investigated, using controlled conditions of temperature, distinct kinds. The first phase in the absorption process is a relatively rapid uptake of rubidium unaccompanied by bromide and this process is unaffected by oxygen, is not confined to the surface cells, and ceases after a short time. During the second phase, which is prolonged, rubidium and bromide are absorbed in equivalent amounts, the absorption is confined to a few layers of cells at the surface and is determined by oxygen concentration in the same manner as for the bromide ion. The two types of absorption are described as "induced absorption" and "primary absorption" in the sense used earlier. The former is merely a property of the substances in the tissue, the latter demands that work should be done, and is a property of the organized living cell. The relationships of the two types of absorption process to time have been described and they can be expressed in terms of equations. The effect of the surface and thickness of discs upon the absorption of bromide and rubidium is interpreted quantitatively. The distance from the surface of the discs at which "primary absorption" ceases is the same for rubidium and bromide, and corresponds with the depth of the layer of tissue with enhanced respiration. The "induced absorption" of rubidium occurs in discs killed by alcohol. The effect of concentration upon this process is similar to the adsorption isotherm. The effect of concentration upon the absorption of bromide by living discs is much less conspicuous, involves the factor of surface and thickness of discs, and the requirements of the absorption isotherm are not rigidly met. Unequal absorption of the bromide and rubidium arises from the superimposed effect of two distinct processes one of which causes the absorption of rubidium only and the other tends to cause equal uptake of rubidium and bromide.—F. C. Steward.

15702. TIEDJENS, V. A., and M. E. WALL. The importance of potassium in the growth of vegetable plants. Proc. Amer. Soc. Hort. Sci. 36: 740-743. 1938(1939).—Data from expts. in sand culture in the greenhouse indicate that K deficiency results in carbohydrate deficiency; that the function of K is to catalyze nitrate and CO₂ assimilation. 44 p.p.m. of K gave optimum growth and greatest amt. of dry matter. More or less K tended to reduce dry matter. An abundance of Ca increased K requirement; an abundance of K increased Ca requirement.—Authors.

AUXINS, GROWTH HORMONES

15703. AVERY, G. S. Jr., H. B. CREIGHTON, and C. W. HOCK. A low cost chamber for phytohormone tests. Amer. Jour. Bot. 26(6): 360-365. 1 fig. 1939.—A small galvanized iron chamber is described for use in the Avena test for plant growth substances. It permits perfect humidity control if kept in a constant-temp. darkroom and thus obviates ex-

pensive humidity-control equipment and maintenance expense. The chamber is large enough to care for 8 or 9 racks of Avena seedlings (each holding 12 plants) in water culture. Several control chambers may be housed in a single dark-room. Schedules are given for the "deseeded" and "standard" Avena methods (Skoog and Went) as used in comparative tests in the new control chamber and in the usual constant-temp. constant-humidity test room. The results of such tests on more than 100 dozen test plants are included.—Auth. summ.

15704. BAUSOR, S. C. A new growth substance, β -naphthoxyacetic acid. Amer. Jour. Bot. 26(6): 415-418. 1939.—The synthesis and physiol. activities of β -naphthoxyacetic acid as a growth substance are reported. Lanolin pastes containing various cones., applied unilaterally to the stems and leaves of intact plants of Ocimum basilicum, Mimosa pudica, Eranthemum nervosum and tomato, produced curvatures in all of these spp., followed by the formation of roots in Ocimum and Lycopersicum. A 0.1% paste was optimum for root induction. Cuttings of Coleus blumei and Taxus cuspidata were treated with aqueous solns. of β -naphthoxyacetic acid: more abundant roots were produced on the treated Coleus cuttings than on the controls; the expts. with Taxus were inconclusive.—S. C. Bausor.

15705. BRANNON, MELVIN A., and ALFRED F. BARTSCH. Influence of growth substances on growth and cell division in green algae. Amer. Jour. Bot. 26(5): 271-279. 1 fig. 1939.—The effect of 5 organic acids upon reproduction in 3 unicellular green algae, grown in test tube cultures, was detd. by means of turbidity measurements. Suitable concs. of indole-propionic, indole acetic, indole-butyric, naphthalene-acetic and phenyl-acetic acids, applied in sugar-free inorganic culture media, stimulated reproduction in Chlorella vulgaris and Coccomyxa simplex but not in Mesotaenium calidariorum. Indole-propionic acid produced the least stimulation in Chlorella (73.1% over control), and phenyl-acetic acid produced the most (261.4% over control) after a period of 12 days' growth. The 5 acids exerted no measurable influence upon cell size in either Chlorella or Coccomyxa, but indole-acetic and indole-butyric acids caused a tendency for cell enlargement in Mesotaenium. The growth substance factor and food factor interaction for algae probably is of a different nature from that reported for vascular plants.—A. F. Bartsch.

15706. CHADWICK, L. C., and D. C. KIPLINGER.

effect of synthetic growth substances on the rooting and subsequent growth of ornamental plants. Proc. Amer. Soc. Hort. Sci. 36: 809-816. 1938(1939).—Synthetic growth substances in the form of solns. (indolebutyric acid) and dusts (Auxan and Rootone) were used to observe their effects on plants. The basal ends of cuttings of greenhouse and woody ornamental plants were soaked in various concs. of indolebutyric acid and these were stuck in sterilized media with untreated cuttings as checks. Synthetic growth substances in the form of dusts were used by dipping the basal end of the cuttings in the dust before inserting in the rooting medium. Observations in rooting were made at the time the majority of the treated cuttings had rooted. A few expts. on the effect of growth substances on roots of plants were also performed. All cuttings were rooted in a north lean-to greenhouse, heavily shaded in summer, with thermostatically controlled bottom heat of 74° F and air temps of 60-65° F depending on season. Relative humidity varied between 60 and 80%. Soaking the basal ends of cuttings gave more satisfactory results than spraying or immersing the leaves with solns, of growth substances. Hardwood cuttings of Ligustrum vulgare did not respond favorably to indolebutyric acid applied either before or after callusing. Treatment of softwood cuttings of greenhouse and woody deciduous plants and mature cuttings of narrowleaf evergreens with synthetic growth substances increased the percentage rooting over the untreated cuttings during the period of time the cuttings remained in the bench. In final analysis, the total rooting percentage was not increased but the time required to reach the normal rooting percentage was materially reduced. The quality of the root system produced on softwood cuttings treated with growth substances was superior to the root system on untreated cuttings over the length of time the cuttings were in the bench. The use of growth substances in the majority of cases caused

more roots to be produced over a large stem area. Apparently no relation existed between the number of roots induced and their length. The external position of the roots on plants which exhibit specific rooting habits was not changed by applications of growth substances. Treatment of roots of plants gave variable responses, in general causing a decrease in the root production. In general, plants normally difficult to propagate by cuttings were not benefited enough to make the treatment commercially feasible.—

Authors.

15707. COLLA, SILVIA. Azione di sostanze sintetiche sulla produzione di radici e su altre funzioni della pianta. [Action of synthetic compounds upon root production and on other functions of plants.] Nuovo Gior. Bot. Ital. 46 (1): 101-118. 1939.—Preliminary notes on the influence of hetero-auxin applied in aqueous soln. or as a paste to cut portions of stems, and in aqueous soln. to entire seedlings. In all, 139 spp. were studied, chiefly dicotyledons but a few gymnosperms. Many cuttings root well in half the time of controls; others produce abundant roots even when controls do not produce any. About 50 spp. are reported upon, all greatly helped by the treatment. No details are given of unsuccessful efforts to secure rooting.—F. Ramaley.

15708. HERBST, H. Wuchsstoffe in der gärtnerischen Praxis. I. Heteroauxin in der Tomatenkultur. Gartenbauwiss. 12(4/5): 520-529. 5 fig. 1939.—The paper is a critical evaluation of laboratory expts. applied to cultural practice. Using tomato seeds, young tomato plants, and fruits treated with β indolyl acetic acid, germination and subsequent growth on treatment was not striking enough to warrant the extra cost. Although treatment stimulated the growth of the young plants, the differences between seedlings treated and germinated over water and such not treated and grown over soil were negligible. Spraying with a 0.1% soln, or application of a lanolin paste to the fruit increased the weight of the fruit as compared with the checks. In repeated test from 5-20% increase in weight over non-treated fruits could be observed, but treatment caused the fruit to become spotted and so make it objectionable on the market. In greenhouses or in locations where pollen cannot be transported by air currents causing many flowers not to set fruit, applications of heteroauxin to the pistil proved effective. Under such conditions small seedless fruits could be produced.-K. D. Brase.

15709. JAKEŠ, E., und H. HEXNEROVÁ. Über den Einfluss der Wuchsstoffe auf Wundgewebebildung bei Obstbatimen. Gartenbauwiss. 13(11): 83-93. 3 fig. 1939.—Two synthetic growth substances, a 1% Lanolin Indoleacetic acid of Hoffmann-LaRoche and "Belvitan" a commercial preparation of Bayer, were effective in wound treatment with fruit trees. A correlation between the rapidity and amount of callus formation and green leaves was observed. Although callus formed on defoliated branches, applications of growth substances to wounds on such branches influenced callus formation and development of new leaves. Where 2 wounds were inflicted, one from 2 to 5 cm. above the other, growth substances influenced callus formation to a greater extent on the lower wound; here callus formed quickly and healing was most complete. In such cases substances are apparently transported from the leaves above the upper wound which in part destroy the action of the growth substance applied. This partial destruction may be due to the formation from the leaves of a fermentation product "Oxygenase." The fruit trees used in the tests responded to the treatments in the following order: pear, apple, prune and cherry. The relatively minor effect on cherry trees is believed to be related to a physiological disease "Gummifluss" which often follows injury to cherry trees.—K. D. Brase.

15710. KINOSHITA, SABURO, und ZYUNJIRO KASA-HARA. Über die Wirkung des Wuchsstoffs auf die Wurzelbildung. [In Jap. with Ger. summ.] Bot. Mag. [Tokyo] 53(627): 138-143. 3 fig. 1939.—Heteroauxin and vitamin B. (oryzanin soln.) supplied together clearly stimulate rooting of internodes of Roripa nasturtium-aquaticum; either alone has only a very slight effect. In Chrysanthemum cuttings, bearing a single leaf, heteroauxin stimulates root formation but B. does not. Vitamin B. has a definite root forming influence on Thea sinensis and T. s. var. macrophylla, which root with difficulty. For root formation there is necessary a 2d factor in addition to the growth substance. Vitamin B.

can replace this 2d factor. Plants which root easily appear to be abundantly supplied with this 2d factor.—Auth. summ.

(tr. by R. L. Weintraub)

15711. LINSER, HANS. Zur Methodik der Wuchsstoffbestimmung. II. Die Extraktion von Pflanzenmaterial. Planta 29(3): 392-408. 15 fig. 1939.—The sensitivity of oat seeds to indolyacetic acid decreases with increasing storage time. Auxin should be extracted with alcohol. Such extracted auxin shows a distinct reaction with oat coleoptiles. The total increment is the same but the angle of bending is smaller than with heteroauxin. Extracts of different plants may vary by a factor of 1000. During growth plants synthesize auxin so that the absolute total amt. increases rapidly. If barley seeds are soaked, germinated and the seedlings grown, the auxin content first rises, then falls to a

minimum value and finally increases again.—B. R. Nebel. 15712. MITCHELL, JOHN W., and B. C. BRUNSTETTER. Colorimetric methods for the quantitative estimation of indole(3) acetic acid. Bot. Gaz. 100(4): 802-816. 1939.—The KNO₂-HNO₃ test proved to be applicable for the determination. nation of indoleacetic acid in aqueous solns. having a range of concs. from 0.01 to 0.15 mg. per cc.; the FeCl₃-H₂SO₄ test was suitable for the estimation of total amts. of from 0.02 to 0.1 mg., under the conditions described. The FeCl₃-HCl test was sensitive to essentially the same range of concs. as that of the KNO2 test, but was less suitable as the color

produced was not stable.—Auth. summ.

15713. OBSIL, K. Zur Frage der Blühhormone. Planta
29(3): 468-476. 1939.—Leaves of short-day Chrysanthemum were grafted onto Perilla in various ways without inducing flowering. Other expts. with Scrophularia and Circaea also proved negative. Further expts. with Leonurus, Mentha and Lycopus as receptor and Chrysanthemum, Cannabis, Perilla and Soja as donors also proved futile. It is concluded that the flowering hormones are hard to transmit. The flowering hormones may be extracted with water but do not keep in lanolin; they stimulate flowering in contrast to hetero-auxin and yeast extract.—B. R. Nebel.

15714. OLIVER, R. W. Honey as a stimulant to the rooting of cuttings. Sci. Agric. [Ottawa] 19(9): 586-588. 1 fig. 1939.—Cuttings of Thuja occidentalis pyramidalis and 5 vars. of Chrysanthemum were treated with honey from full strength to a 5% soln. These were grown together with similar cuttings treated with different commercial growth stimulants. In every case honey showed positive results in stimulation of root growth.—R. W. Oliver.

15715. REYNOLDS, ERNEST S. Relations of plants to minute doses of inhibitive substances. Plant Physiol. 14(2): 385-387. 1939.—Oleander (Nerium oleander) cuttings in 0.0013% and 0.02% water solns. of heteroauxin were at first retarded in root formation as compared with cuttings in tap water, but later stimulated as to number of root initials. This apparent accommodation or acclimatization which has been described in other cases cited is believed to be a general type of reaction which should be considered in the interpretation of all physiol, reactions to toxic substances. E. S. Reynolds

15716. STEWART, W. S., W. BERGREN, and C. E. REDEMANN. A plant growth inhibitor. Science 89(2304): 185, 186. 2 fig. 1939.—The ether extract of cotyledons of French Breakfast radish yielded by the simplified method of Van Overbeek a substance producing on Avena effects opposite in character to those produced by indole-3-acetic acid.—Courtesy Exp. Sta. Rec.

15717. TEMPLEMAN, W. G. The effect of some plant growth-substances on dry-matter production in plants. Empire Jour. Exp. Agric. 7(25): 76-88. 1939.—Pot-culture expts. are described in which solns. of β -indolyacetic acid, a-naphthylacetic acid, skatole, and ascorbic acid were applied to plants (white mustard, Brassica alba, chiefly) by spraying on to the foliage and by watering on to the sand. At the relatively high concs. used (0.0033-0.0185% solns.), no significant increases in dry-matter production were observed; in most cases there was a decrease; nor was there any positive response to treatment in presence of added NaNO₃. Na α-naphthylacetate also diminished the drymatter production, compared with plants similarly treated with distilled water. No response was obtained when seeds of white mustard were heated with solns. of growth-substances.— $E.\ H.\ Tripp.$

15718. WATANABE, ATSUSHI, MASAHIKO KODATI, and SABURO KINOSHÍTA. Über den Einfluss des Wuchsstoffs auf das bioelektrische Potential der Myxomyceten-Plasmodien. Bot. Mag. [Tokyo] 53(625): 32-42. 9 fig. 1939. —Application of heteroauxin (156 to 1250 γ per liter) to the front of the plasmodium of Didymium nigripes var. xanthopus increased the p. d. between the front and the rear portion. The lower heteroauxin conc. was more active; the higher conc. gave only a slight effect. Still higher concs. (20 mg/L) depressed the p d. The threshold conc. of heteroauxin was about 39 γ /l. a-Methyl-heteroauxin at 1.25 and 20 mg/l was less active than heteroauxin. Dinitrophenol, I-histidine and urea in appropriate concs., also increased the bioelectric potential of the plasmodium. Heteroauxin probably influences the bioelectric potential through activation of the oxidative metabolism.—R. L. Weintraub.

15719. WEINTRAUB, R. L. An assay method for growthpromoting substances utilizing straight growth of the Avena coleoptile. Smithsonian Misc. Coll. 97(11): 1-10. 1 pl., 1 fig. 1938.—The assay method here described for growth-promoting substances, utilizing straight growth of the oat coleoptile, possesses a number of theoretical and practical advantages over the widely used curvature test.—Courtesy Exp. Sta. Rec.

15720. WENT, F. W. Transport of inorganic ions in polar plant tissues. Plant Physiol. 14(2): 365-369. 1939.—In expts. on the transport of radio-active Na*, PO₄ and Br ions in Avena coleoptiles and Helianthus hypocotyls, it was found that these ions were moving both apically and basally, whereas simultaneously indole acetic acid moved exclusively basally.—F. W. Went.

15721. YAMANE, GINGORO. Die Wuchsstoffverteilung in den euphotometrischen Blättern von Fatsia japonica. Bot. Mag. [Tokyo] 53(627): 102-113. 1939.—The petioles of detached leaves of F. japonica were split for various lengths and 3% agar applied to the cut surfaces. One longitudinal half of the leaf blade was shaded with black paper and the other illuminated by electric light for periods varying from 4 to 24 hours. Both halves of the split petiole were uniformly illuminated or shaded. The growth substance which diffused into the agar during this period was assayed by the Avena curvature method. Although considerable discrepanding the substance which all the substance w cies, which may be due to the previous history of the leaf, occurred in individual expts., the general result was that much more growth substance could be collected from the shaded side than from the illuminated side. For the longer illumination periods the growth substance production of the light side was only \(\frac{1}{2} \) that of the dark side, Similar differences were found also in intact leaves which had been nonuniformly illuminated by sunlight. Tests with various portions of petiole applied directly to \(Avena \) coleoptiles showed that practically all of the growth substance is present in the vessels with only traces in pith and cortex (including parenchyma) indicating that the vessels are the principal path of transport. Formation of leaf mosaics in Fatsia apparently is due to the growth substance distribution in the petioles.—R. L. Weintraub.

PROTOPLASM

15722. NORTHEN, HENRY T., and REBECCA TYSON NORTHEN. Time and temperature of protoplasmic coagulation. Plant Physiol. 14(1): 175-176. 1939.—A temp. of 43.5° C caused coagulation of the protoplasm in cells of Spirogyra and Zygnema in less than 1 min.; in coleoptile cells of oats, rye, and wheat, in 12-15 min.; and in coleoptiles cells of corn, in 30 min. Coagulation was evidenced by failure of centrifugation to displace the chloroplasts in Spirogyra and Zygnema or the granules in the coleoptile cells.—R. T. Northen.

OSMOSIS, PERMEABILITY

15723. DAMON, E. B. Bioelectric potentials in Valonia. II. Effects of artificial sea waters containing LiCL, CsCl, RbCl, or NH.Cl. Jour. Gen. Physiol. 22(6): 819-833. 1939.—In their influence on the P.D. across the protoplasm of V. macrophysa, Li+ and Cs+ resemble Na+, while Rb+ and MH_{4}^{+} resemble K^{+} . The apparent mobilities of the ions in the external surface layer of Valonia protoplasm increase in the order: Cs⁺, Na⁺, Li⁺ < Cl⁻ < Rb⁺ < K⁺ < NH₄⁺.—

15724. JACQUES, A. G. The kinetics of penetration. XIX. Entrance of electrolytes and of water into impaled Halicystis. Jour. Gen. Physiol. 22(6): 757-773. 1939.—When cells of H. osterhoutii are impaled on a capillary so that space is provided into which the sap can migrate, the rate of entrance of water and of electrolyte is increased about 10-fold. In impaled *Valonia* cells the rate is increased about 15fold. After a relatively rapid non-linear rate of increase of sap volume immediately after impalement (which may possibly represent the partial dissipation of the difference of the osmotic energy between intact and impaled cells) the volume increases at a linear rate, apparently indefinitely. Since the halide conc. of the sap at the end of the expt. is (within the limits of natural variation) the same as in the intact cell, we conclude that electrolyte also enters the sap about 10 times as fast as in the intact cell. As in the case of Valonia we conclude that there is a mechanism whereby in the intact cell the osmotic conc. of the sap is prevented from greatly exceeding that of the sea water. This may be associated with the state of hydration of the non-aqueous

protoplasmic surfaces.—Auth. summ.

15725. JACQUES, A. G. The kinetics of penetration.

XVIII. Entrance of water into impaled Halicystis. Jour.

Gen. Physiol. 22(6): 743-755. 1939.—The rate of entrance of water into impaled cells of H. osterhoutii was detd. directly by measurements of the rise of sap in a capillary for dilute sea waters (containing between 90 and 30% sea water). The velocity constant remains reasonably constant down to 50% sea water but it decreases markedly in lower concs.—Auth.

GERMINATION, DORMANCY

15726. DUNN, L. E. Influence of low temperature treatments on the germination of seeds of sweet clover and smooth vetch. Jour. Amer. Soc. Agron. 31(8): 687-694. 1939. —Locally grown seed samples of sweet clover (Melilotus alba) and smooth vetch (Vicia villosa) were kept for 1 to 10 months in moist and dry storage under the following conditions: Room temp.; 5° C; —10° C; —10° C for 1 week followed by continuous storage at 5° C; alternations in weekly intervals between temp. above and below freezing. At the close of a storage period for a sample, dead seeds and seed which had produced radicles more than 1 cm long were discarded. The remainder of the sample was tested for germination on the basis of the original number of seeds in the sample as 100%. No low-temp, storage treatment was found which would cause seed samples to give higher germination percentages than seed samples which had been stored dry at room temp. The various moist- and drystorage treatments caused softening of the hard seeds of V. villosa but did not soften hard seeds of M. alba. After 6 months moist storage only 20% of the original hard seeds of V. villosa were still impermeable. In all cases hard seeds which had softened germinated normally when they were not frozen after taking up water. Probably the majority of hard seeds of V. villosa would germinate and produce plants within the first 2 or 3 months after planting.—L. E. Dunn.

GROWTH, DEVELOPMENT

15727. ANDERSON, A. K. Growth and metabolism of Fusarium lini. Pennsylvania Agric. Exp. Sta. Bull. 367. 8. 1938.—The growth-stimulating effect of the carcinogenic hydrocarbon 1,2,5,6-dibenzanthracene on F. lini is briefly referred to.—Cowrtesy Exp. Sta. Rec. 15728. GALLIGAR, GLADYS C. Growth behavior of one-millimeter excised root tips. Plant Physiol. 14(1): 163,169, 1929. One pure root tips of doct agent supflewers.

163-169. 1939.—One-mm. root tips of dent corn, sunflower, sweet corn, cotton, Gradus pea and Burpee's Extra Early Pea were grown in sterile nutrient soln, based on Pfeffer's formula plus dextrose and peptone. Within the first 10 days sunflower and dent corn surpassed sweet corn in the rate of elongation while the other 3 spp. grew scarcely at all. Dent corn developed short roots with an abundance of laterals with the reverse condition obtaining in the case of the sweet corn. Comparison of results with an earlier expt. showed that 1-mm. root tips of sunflower achieved greater growth than 10-mm. root tips of the same species.—G. C.

15729. HAYWARD, H. E., and F. W. Went. Transplan-

tation experiments with peas. II. Bot. Gaz. 100(4): 788-801. 3 fig. 1939.—The anatomy and histology of the graft union of etiolated pea stems was investigated. Separation into 4 types was made between the grafts which grew rapidly or slowly from the beginning, and those which ultimately did or did not take. Grafts in which the initial growth was rapid had good approximation of the original vascular bundles of stock and scion. When approximation was poor, the grafts grew slowly at first; and in the grafts which ultimately "took" there was good development of new vascular connections between stock and scion. These were lacking or nearly so in the unsuccessful grafts. Additional expts. were carried out to show that only the initial growth rate and the period before the scion reaches its maximal growth rate are affected by poor or good initial approxi-mation of the vascular bundles. Ultimate growth of the scion is not affected by the type of grafting or the graft union. The effect of initial good approximation of vascular bundles of stock and scion on initial growth indicates that the movement of growth factors of the caline type seems

to take place under mass pressure.—Auth. summ.

15730. HESTER, JACKSON B. The absorption of nutrients by the tomato plant at different stages of growth.

Proc. Amer. Soc. Hort. Sci. 36: 720-722. 1938(1939).—Chemical analyses, at monthly intervals, of tomato plants grown on a Sassafras sandy loam (well fertilized with N-P-K) showed that during the first month the plant only made 2% of its final growth and took up only about 3% of the total plant nutrients absorbed. During the 3d month it made 72% of its final growth and utilized about $\frac{2}{3}$ of the total plant nutrients. Large quantities of N and K were transferred to the fruit from the leaves and thus were removed from the soil. Much of the Ca, Mg, and P was returned to the soil in the foliage.—J. B. Hester.

15731. HEYN, A. N. J. Some remarks on the mechanism of the spiral growth of the sporangiophore of Phycomyces and a suggestion for its further explanation. K. Akad. Wetenschap. Amsterdam Proc. Sect. Sci. 42(5): 431-437. 1939.—Chitin molecules form the frame work of the cells. The molecules resemble cellulose chains but the glucose residue bears a short protein side chain oriented perpendicularly to the surface of the cell wall. The primary position of the chitin molecules in the region of elongation is supposed to be parallel to the long axis of the organ. At this stage the molecules have not yet attained complete crystalline configuration. Later, transition into the denser crystal lattice takes place, which must be accompanied by the molecules taking positions differing 13.5° or 27° from the long axis of the organ. This causes spiral growth.—

J. van Overbeek.

15732. NOBÉCOURT, P. Sur les radicelles naissant des cultures de tissus du tubercule de carotte. Compt. Rend. Soc. Biol. 130(12): 1271-1273. 1939.—White, Robbins and others have shown that tomato roots cannot grow indefinitely in the absence of a vitamin B₁-like substance possessing the thiazol ring. The author has now grown carrot rootlets in a medium lacking this substance. It is concluded, therefore, that the protuberances from which the rootlets originate can synthetize vitamins B₁, probably by

chlorophyll.-H. Simons.

15733. WILLIAMS, R. F. Physiological ontogeny in plants and its relation to nutrition. 6. Analysis of the unit leaf rate. Australian Jour. Exp. Biol. and Med. Sci. 17(2): 123-132. 3 fig. 1939.—The unit leaf rates (net assimilation rates) previously obtained in 4 expts. with wheat, Sudan grass (Andropogon sudanensis) and oats are analyzed. One of the important factors causing the characteristic decline in this rate is the progressive decrease in the cytoplasm content of the leaves with time. Since the best available measure of this content is the protein content, net assimilation rate has been expressed on a protein basis. The latter rate was found to be closely related to drifts in certain climatic factors. This relation was obscured when the rate was left on a dry-weight basis. Certain effects of the varying nutrient supplies on net assimilation rate (protein basis) are discussed in relation to the N status of the respective plants.—R. F. Williams.

VITAMINS

15734. ADDICOTT, FREDRICK T. Vitamin B, in relation to meristematic activity of isolated pea roots. Bot.

Gaz. 100(4): 836-843. 7 fig. 1939.—Vitamin B₁ is known to be a root growth hormone. If it is omitted from the culture medium, excised pea (Pisum sativum) roots cease growth in the course of 3 weeks. Paraffin sections of pea roots which had been cultured with and without the addition of vitamin B₁ were studied. The presence of vitamin B₂ permits continued meristematic activity in the root, while in its absence meristematic activity ceases. Cell elongation, maturation, and differentiation proceeded normally in roots to which vitamin B₁ was not supplied. Thus the hormonal activity of vitamin B, on growth is distinct from that of the auxins which primarily affect cell elongation.—F. T. Addicott.

15735. BONNER, I. J., and E. R. BUCHMAN. Synthesis

carried out in vivo by isolated pea roots. Proc. Nation. Acad. Sci. Proc. U.S.A. 24(10): 431-438. 1938.—Under closely controlled environment and nutrient supply it is shown that the isolated pea root synthesizes vitamin B1 or something indistinguishable from it by Phytophthora assay from a mixture of the pyrimidine and thiazole components of the vitamin molecule, and that this reaction is carried out in vivo under conditions such that no in vitro reaction can occur. This must be a synthesis in which a specific enzyme takes part. A 2d and distinct enzyme system is able to effect closure of the thiazole ring from suitable acyclic substances to form the vitamin thiazole. Both "thiaminase" and "thiazolase" probably have a rôle in the natural synthesis of thiamin by the plant. Certain thiazole derivatives are transformed into thiazole in vivo by enzymatic reactions corresponding to deamination, decarboxylation, hydrolysis, and hydration; certain other growth-promoting thiazoles are not so transformed. The methods outlined may offer a new and more exact approach to the problem of the

mechanism of biosyntheses.—Courtesy Exp. Sta. Rec. 15736. CLARK, NORMAN A., B. H. THOMAS, and E. E. FRAHM. The formation of vitamins A, B., and C in Lemna grown in the absence of organic matter. Iowa State Coll. Jour. Sci. 13(1): 9-16. 1938.—L. major (Spirodela polyrhiza) was grown in soil-water cultures and also, free from micro-organisms, in inorganic salt solns. When the plants, from either source, were fed to rats which had been restricted to a vitamin A-deficient diet, the xerophthalmia disappeared and the weight of the rats increased. Similar results were secured with rats fed a vitamin Bi-deficient diet and later supplemented with the Lemna. In these tests more vit. B1 was formed in the Lemna grown under the sterile conditions without organic matter than in the plants in the soil-water soln. containing micro-organisms and organic material. The presence of vitamin C in the Lemna was indicated by iodine and by 2,6-dichlorophenolindophenol titrations. Storage of the plants tended to decrease the amts. of all 3 vitamins.-Authors.

15737. COOPER, WILLIAM C. Vitamins and the germination of pollen grains and fungus spores. Bot. Gaz. 100 (4): 844-852, 1939.—Water solutions of several different vitamins and a number of other organic compounds were tested individually by the van Tieghem hanging drop technique for effect on germination of the pollen of Carica papaya and of the spores of Colletotrichum gloeosporioides and Penicillium italicum. Lactoflavin (natural product) and ascorbic acid gave unusually high germination percentages for pollen of 4 vars. of C. papaya. The maximum and minimum effective conc. of lactoflavin were 10 and 50 γ per cc., and that of ascorbic acid were 50 and 100 γ per cc. The activity of the natural preparation of lactoflavin is attributed in part to the presence of B as an impurity. Synthetic lactoflavin, however, was active. Thiamin chloride, nicotinic acid, indoleacetic acid, and the hydrochlorides of several amino acids were also slightly acitve in pollen germination, but the action of these substances appeared to be a pH effect. Thiamin, nicotinic acid, ascorbic acid, lactoflavin, and several amino acids induced germination of C. gloeosporioides spores cultured on cornmeal agar, but only lactoflavin induced germination of spores grown on oatmeal agar. Synthetic lactoflavin was just as active in inducing germination of *C. gloeosporioides* spores as was the natural lactoflavin preparation. Amino acids induced germination of P. italicum spores; addition of lactoflavin to the amino acids inhibited germination materially.-W. C. Cooper.

15738. LESH, JAMES B., L. A. UNDERKOFLER, and

ELLIS I. FULMER. The effect of the composition of the medium upon the growth of yeast in the presence of Bios preparations. II. The response of several strains of Saccharomyces cerevisiae. Jour. Amer. Chem. Soc. 60: 2505-2507, 1938.—The effect of Bios II, inositol (Bios 1) and MgSO₄, alone and in combinations, on the growth of 13 strains of Saccharomyces cerevisiae is reported. The yeast strains are separated into 3 groups: (1) the addition of MgSO4 with Bios II does not give increased growth; (II) the addition of inositol with Bios II does not give increased growth; (III) growth is increased under the conditions given for Groups I and II. Discrepancies in published results of Bios studies may be due to differences in strain of yeast employed, and in composition of medium.-L. A. Underkofter.

15739. YARBROUGH, MARY, and G. HOWARD SATTERFIELD. The relationship of acidity to the vitamin C content of the tomato. Jour. Elisha Mitchell Sci. Soc. 54 (2): 186-187, 1938,

PHOTOPERIODISM

15740. HAMNER, KARL C., and AUBREY W. NAYLOR. Photoperiodic responses of dill, a very sensitive long day plant. Bot. Gaz. 100(4): 853-861. 3 fig. 1939.—Dill (Anethum graveolens) is a long day plant which has an induction period of less than 4 days and which undergoes stem elongation and flowers within a short time after photoperiodic induction. Plants remain vegetative under ordinary greenhouse conditions at photoperiods of less than 11 hours' duration and flower on photoperiods in excess of 14 hrs. With continuous illumination, up to 132 hrs., stem elongation took place at a rate roughly proportional to the number of hours of light received. Exposure of a single leaf to long photoperiod, while the remainder of the plant was maintained on short photoperiod, induced the entire plant to flower.—A. Naylor.

15741. KNOTT, J. E. The effect of temperature on the photoperiodic response of spinach. Mem. [New York] Cornell Univ. Agric. Exp. Sta. 218. 1-38. 10 fig. 1939.— Although a complete interacting range of both temp. and photoperiod was not included in the study, the data suggested that for spinach the photoperiod may be less important than temp. in determining the reproductive response. The photoperiod necessary to cause the appearance of seedstalks was apparently determined by the temp. during early growth complemented by the temp. prevailing during the later stages of development. In the case of plants growing under a 15-hr. photoperiod and exposed to 3 temp. ranges, namely, from 50° to 60° F, 60° to 70°, and 70° to 80°, the 60°-to-70° lot was the earliest to initiate seedstalks. At 40°-50° and 15 hr. of light, plants made little growth, but when subjected to favorable temps, they developed seedstalks sooner than did those plants not subjected to an initial low-temp. treatment. Under both the 15-hr. and the natural photoperiod, the higher the temp. at which the plants were growing the sooner after the completion of the initial treatments did the blooms appear. The rate of elongation of seedstalks was influenced by the prevailing sunshine, photoperiod, and temp. in descending order. The possible rôle of temp. in the production of a flower-promoting hormone is discussed. The fact that spinach exposed to a 7-hr. day at from 60° to 70° did not form seedstalks until Mar. 14 following the planting on Oct. 11 may have been due to the slow production of the hormone. The relation of the observations to the behavior of spinach in the field is indicated.—Courtesy Exp. Sta. Rec.

15742. SINGH, B. N., and R. S. CHOUDHRI. The influence of light on shoot elongation and branching in Crotalaria juncea. Trop. Agric. [Trinidad] 15(9): 202. 1 fig. 1938.— Since fiber length is of great importance in Indian hemp, potted plants were subjected to various periods of illumination daily. Increasing illumination caused a rapid increase in shoot length until a photoperiod similar to normal daylight was reached, and photoperiods above this value caused much smaller increases. Increasing illumination up to normality caused the plants to develop more branches, but with longer daily periods there was a rapid decline in the number, so that with 18 hours daily illumination or

over, no branches were formed.—W. D. Pierce.

PHOTOSYNTHESIS

15743. ECKSTEIN, OSCAR. Effect of potash manuring on the production of organic matter. Plant Physiol. 14(1): 113-128. 4 fig. 1939.—Assimilation of CO₂, as measured by its removal from an air current passing through a sealed chamber in which plants are growing under fully controlled conditions, is taken as an indicator of organic matter production. Varying amts. of K₂O were supplied to the plants growing under high and low levels of N and P nutrition. At low levels of nutrition the maximum CO₂ assimilation was reached with a comparatively low K₂O application; with a high level of nutrition, the maximum was not reached until 10 times as much K₂O had been applied. Similar results were obtained at several stages of growth of wheat, the plant used in these investigations. Transpiration increased with the increments in K₂O fertilization but chlorophyll content reached a maximum and then decreased. Chlorophyll content of leaves is thus no criterion of their assimilative ability. Using the "relative protein value" of Paech as the criterion of protein formation, after which it was constant with further potash increments. Potash fertilization apparently had no effect on diameter of stomata. Assimilation of CO₂ in the plant reached its maximum point and began declining before the maximum point of protein formation occurred.—J: D. R.

TRANSPIRATION, WATER RELATIONS

15744. BIALE, J. B. Transpiration of lemon cuttings with reference to leaf-root relationship. Proc. Amer. Soc. Hort. Sci. 36: 250-254. 1938(1939).—Effects of leaf removal on transpiration of rooted leafy lemon cuttings under constant environmental conditions were studied. A decrease in foliage area of 29, 32, 33, and 28% brought about an increase in water loss per unit leaf surface of 75, 35, 12, and 10%, respectively. When root conditions were taken into consideration it was found that if the leaf area in sq. dm. per g. of root dry weight is higher than 8, transpiration per unit area increases with leaf removal. A reduction in foliage at ratios lower than 5 does not alter the rate of water loss significantly.—I. B. Biole.

water loss significantly.—J. B. Biale. 15745. HEATH, O. V. S. Experimental studies of the relation between carbon assimilation and stomatal movement. I. Apparatus and technique. Ann. Botany 3(10): 469-495. 1 pl., 7 fig. 1939.—Expts. of 2 types have been carried out: in (a) air is passed over the leaf surfaces and CO₂ passes into the leaf by diffusion through the stomata; in (b) air is forced through the leaf so that diffusive control by the stomata is eliminated. Two pairs of transparent leaf chambers are attached above and below the leaf in such a manner that the upper and lower chambers exactly register. Each pair consists of an inner chamber surrounded by an outer chamber of equal area. In expts. of type α air streams of the same known CO₂ content are passed through all the chambers at flow rates approx. proportional to the numbers of stomata on the surfaces enclosed. The ratios of the flow rates are controlled by fixed capillary resistances, and atmospheric pressure is maintained in the chambers during flow by a method of balanced pressure and suction. Assimilation is measured by a conductivity method on the gas from the inner chambers only, the outer chambers serving as "guard rings" to prevent lateral diffusion of CO₂ luring assimilation. In expts. of type b air is forced into the leaf through the stomata from the outer chambers with certain positive pressure and withdrawn into the inner hambers with an equal negative pressure, thus travelling aterally through the intercellular spaces; the mean pressure n the leaf meanwhile being maintained at atmospheric. From the inner chambers it passes to the conductivity cell or analysis. By keeping the rate of flow constant any tomatal control of CO2 supply to the intercellular spaces s eliminated. In both types of expt. 5-min. readings of ssimilation are taken during stomatal opening. Stomatal perture is estimated by the resistance porometer method Gregory and Pearse, 1934), the lower inner chamber being sed as a porometer cup. The stomata concerned are thus dentical with those responsible for the assimilation meaured. In the middle of each 5-min. assimilation period, ir-flow is interrupted for 20 sec. while a porometer reading

is made. The change over from assimilation to porometer and vice versa is effected by turning simultaneously 2 "composite" taps, each of which operates on 5 flow lines. The total air-flow may be measured significantly to within 0.16% for 10 min. flow. In expts. of type a it is divided equally between the inner and outer chambers with an accuracy of the order of 0.1%, and the greatest pressure difference found between upper and lower chambers is 0.5 mm. of water. The conductivity method used (Newton, 1935) has been made sensitive to 0.0001 mg. of CO_2 , the amt. in 2 cc. of ordinary air.—From auth. summ.

15746. ROUSCHAL, ERNST. Beiträge zum winterlichen Wasserhaushalt von Cheiranthus cheiri und anderen wintergrünen Gärtenpflanzen. Oesterreich. Bot. Zeitschr. 88(2): 148-154. 1 fig. 1939.—The damages frequently observed in C. cheiri, chiefly after longer periods of dry cold, are recognized as drought phenomena caused by insufficiently checked transpiration. For this species and a number of other evergreen plants frequently cultivated in Central Europe, winter transpiration, state of stomata, and saturation-deficit were measured. Except Cheiranthus and Vinca major, they are absolutely cold-resistant. In the latter, the low saturation-deficit, in contrast with the high value in Cheiranthus, indicates that here the damages are due to frost directly and not to drought. In winter water absorption by leaf-surface can be ecologically important as compared with transpiration; the latter, as a rule, is merely cuticular in winter, the stomata being nearly shut.—M. Onno.

15747. SMITH, H. B. Stomatal index and transpiration rate of leaves. Science 89(2308): 268, 269. 1939.—The author presents observations on beans supporting the view that juvenile leaves may be advantageously used to compare plants in breeding work dealing with transpiration rate, and that transpiration rate is associated with stomatal index rather than with stomatal number. This index may be determined from any of the leaves of a young bean plant.—Courtesy Exp. Sta. Rec.

15748. STOUT, P. R., and D. R. HOAGLAND. Upward and lateral movement of salt in certain plants as indicated by radioactive isotopes of potassium, sodium, and phosphorus absorbed by roots Amer. Jour. Bot. 26(5): 320-324. 1939.—Radioactive isotopes of K, Na, P, and Br were used in studying the upward movement of salt in actively growing and transpiring willow and geranium plants, after absorption of these isotopes by the roots. The technique of isolating a strip of bark from the wood was followed. In this strip of bark the radioactive elements moved extremely slowly. Within short periods of time, no certainly significant amount of radioactivity could be detected in the central section of the strip; while large amounts were present in the wood. However, where wood and bark were in contact, radioactive elements were rapidly transferred laterally from wood to bark. The evidence is consistent with the view that the xylem is the path of rapid upward movement of salt.— Auth. summ.

15749. STRUGGER, SIEGFRIED. Die lumineszeuzmikroskopische Analyse des Transpirationsstromes in Parenchymen. Biol. Zentralbl. 59(5/6): 274-288. 4 fig. 1939.—Berberin sulfate is a highly diffusible basic stain with properties of dissociation which make it especially useful in the analysis of the extrafascicular transpiration. Its use in epidermis cells of Allium cepa showed that in acid, weakly acid or neutral conditions it accumulated only in the cell membrane. In strongly alkaline soln., especially over pH 11, it is quickly taken up in considerable strength by the cytoplasm and nucleus. Vacuoles remain unstained. In the cytoplasm it stains the microsomes but not the mitochondria. In the nucleus it stains the negatively charged micellar framework of the karyotin in contrast to the positively charged karyolymph. Plasma streaming occurred even 2 to 3 days after careful staining. Fluorescent berberin rhodanid crystals are formed in membrane and protoplast when stained cells are plasmolyzed with 0.6 M KCNS.—A. H. Hersh.

METABOLISM

15750. MOTHES, K. Über den Schwefelstoffwechsel der Pflanzen. II. Planta 29(1): 67-109. 1938.—Analysis was made for the following sulphur fractions: Protein sulphur formed in compounds not soluble in trichloracetic and silicotungstic acid; sulphate sulphur comprising preformed inorganic or sulphuric acid from ester combination made free by acid hydrolysis; half-oxidised sulphur from sulphite-like compounds; neutral sulphur consisting of sulphonic acid and reduced sulphide-like combinations. The greatest differences during development pertain to the sulphate-S. Young active parts contain much neutral sulphur; conductive tissue contains much sulphuric acid. The sieve tubes contain S-H compounds. The mature seed contains protein sulphur. The reduction of sulphates of which all plants are capable depends on internal conditions. Nitrate enhances the oxydation of sulphydryls and impedes the reduction of sulphates. Also the chloride uptake is increased by nitrates. Chlorides decrease the sulphate uptake due to changes in the diffusion rates and anion gradients.—B. R. Nebel.

RADIATION

15751. BUONO, P. del. Über einige ungelöste Probleme der Strahlenbiologie (experimentelle Untersuchungen). Strahlentherapie 65(1): 108-120. 8 fig. 1939.—The effect of irradiation with x-rays (140-180 kv., 0.6 mm. Cu. 23-35 cm., 3 ma.) on seedlings of peas, wheat and sorghum depends upon the amt. of the dose and upon the condition of the plant. Increased growth may result from slight irradiation, but larger doses result in diminished growth. This injury increases with dosage for doses above 100 r. Sorghum is more sensitive to irradiation on the 6th day after germination than on the 3d or 10th day; peas and wheat are injured more by irradiation on the 3d day than on the 1st or 6th.—L. Fourt.

15752. HERCIK, FERDINAND. Über die Wirkung der a-Strahlen auf die Zelle mit besonderer Berücksichtigung der Kernreaktion. Strahlentherapie 64(4): 655-670. 1939.— Epidermal cells from bulbs of Allium cepa were irradiated with Polonium a-particles and the subsequent injury was determined 24 hrs. later by supravital staining with erythrosin. Survival ratios plotted against incident dosage in a particles per mm² gave S-shaped curves corresponding to a 3-hit-to-kill mechanism. The dose for 50% survival was 34 × 10° a-particles per sq. mm. (5.1 × 10° r), indicating an insensitive object. Expts. with a particles of various ranges and with nuclei displaced by centrifuging, led Hercik to conclude that the nucleus rather than the cytoplasm contains the "sensitive volume." Cytoplasmic injury follows only when its entire volume is traversed by the radiation.— F. M. Uber.

15753. JOHNSON, EDNA L. Floral development of certain species as influenced by X-radiation of buds. Jour. Colorado-Wyoming Acad. Sci. 2(5): 39. 1939.—White stippling, spotting, color and shape changes, and many other abnormalities followed one medium X-ray dose given to Salpiglossis plants in bud; but buds over 1 cm. long at time of irradiation developed normally.—F. Ramaley.

15754. POPP, H. W. Effect of ultraviolet radiation on plants. Pennsylvania Agric. Exp. Sta. Bull. 367. 32, 33, 34. 1938.—Note on the effects of different wavelengths on growth substance and development of plants.—Courtesy Exp. Sta. Rec.

15755. ZAHL, PAUL A., L. R. KOLLER, and C. P. HASKINS. The effects of ultra-violet radiation on spores of the fungus Aspergillus niger. Jour. Gen. Physiol. 22(6): 689-698. 1 fig. 1939.—The survival ratio of Aspergillus spores exposed to u.-v. radiation was measured as a function of total incident energy for wave lengths of 2537, 3022, 3129, and 3650 Å. The effect of humidity on killing of Aspergillus spores by u.-v. radiation was found to be negligible. Irradiation delayed germination. The Bunsen-Roscoe reciprocity law holds within the limits of the radiation intensities studied. Certain morphological changes were observed.—Auth. summ.

BIOELECTRIC POTENTIALS

15756. REHM, W. S. Electrical response of Phaseolus multiflorus to electrical currents. Plant Physiol. 14(2): 359-363. 1939.—Electrical currents were passed through various parts of this plant for periods of 3 minutes. After the applied current was discontinued, measurements of the p.d. between certain parts of the plant were made with either an electrometer or a potentiometer. With currents

6 to 10 microamperes the potential differences were slightly increased if the current opposed the orientation of the inherent potentials and decreased if it was in the same direction. However, with currents of 20 to 60 microamperes the gross response of the potentials was independent of the direction of the applied current; there was a marked increase in basal positivity (a basal contact became relatively more positive with respect to an apical contact).—W. S. Rehm.

RESPIRATION

15757. BROWN, JAMES W. Suggestions for the use of Warburg respirometers in plant physiological investigations. Plant Physiol. 14(2): 309-320. 1 fig. 1939.—A correction is necessary for the absorption of O₂ during the interval between the final O₂ reading and the final CO₂ reading. Since reliable solubility values are frequently not available for the reagents commonly used in respiration expits., more accurate results may be obtained by omitting a correction for the solubility of gases. Differences in volume of respirometers prevent the direct application of a control correction for CO₂ in the reagents. A sample set of recordings and calculations are given.—J. W. Brown.

15758. GERHARDT, FISK, and BOYCE D. EZELL.

15758. GERHARDT, FISK, and BOYCE D. EZELL. Respiration and emanation of volatiles from Bartlett pears as influenced by ripening and storage. Proc. Amer. Soc. Hort. Sci. 36: 423-426. 1938(1939).—The respiration and emanation of total volatile substances from Bartlett pears were studied at intervals during ripening and storage. The respiratory climacteric at 65° F occurred 7 or 8 days prior to the climacteric for total volatile emanation. The latter was directly associated with the presence of scald and core break-down, and could be positively correlated with the conc. of acetaldehyde in the fruit tissue. Only a trace of volatile material was emanated when Bartlett pears were ripened to prime dessert quality at harvest. It was only when the fruit became over-ripe that volatile emanation increased. The tempo of both respiration and volatile emanation increased when Bartlett pears were ripened after periods of storage at low temp.—F. Gerhardt.

mcreased. The tempo of both respiration and volatile emanation increased when Bartlett pears were ripened after periods of storage at low temp.—F. Gerhardt.

15759. LUNDEGARDH, H. Mangan als Katalysator der Pfianzenatmung. Planta 29(3): 419-426. 1939.—Addition of .00005 M MnCl₂ enhanced by 155-470% the O₂ consumption (measured by the Winkler method) of roots (without tops) of wheat seedlings. The corresponding addition of Fe had no effect. The anion uptake was not enhanced by Mn. Mn may catalyse the complete oxidation of glucose. Measurements of p. d. between the protoplasm and the soln. show that without Mn the negative potential of -70 Mv drops to -22; with Mn this drop does not occur. This membrane stabilization is similar to that of Ca but Ca and Mg must be supplemented by Mn. The intermediate products of the glucose oxidation may possibly furnish the starting material for amid synthesis.—B. R. Nebel.

15760. STIER, T. J. B., and M. ISABEL NEWTON. Changes in the rate of respiration of bakers' yeast during assimilation. Jour. Cell. and Comp. Physiol. 13(3): 345-351. 1939.—The rate of O₂ consumption of bakers' yeast is constant for about the first 2 hrs. (25°C) after the addition of dextrose, then steadily declines during the next hour, finally becoming constant after the 3d hour. The rate of aerobic CO₂ production declines steadily during the first 3 hrs. and then proceeds at a constant rate. The R.Q. becomes 1 after the 3d hr. The changes in rate of respiration are correlated in time with changes in anabolic activity. During the first 2 hrs. a rapid increase in dry weight occurs which results primarily from an increase in carbohydrate content. The dry weight then continues to increase but at a much slower rate and, in this particular strain of yeast, there is no further increase in carbohydrate. The changes in rate of respiration are not brought about by the decline in dextrose concentration or by the alteration in composition of the atmosphere in the respirometer vessels. Supplementary expts. indicate that the observed respiratory "block" is produced either directly as a consequence of changes in the finer cytological structure of the cell during carbohydrate assimilation, or indirectly through the action of some by-product of dextrose metabolism after the cellular structure has become sufficiently altered during the course of assimilation.—Auth. (courtesy Wistar Bibl. Serv.).

CARBOHYDRATE METABOLISM

15761. HAWKER, LILIAN E. The influence of various sources of carbon on the formation of perithecia by Melanospora destruens Shear in the presence of accessory growth factors. Ann. Botany 3(10): 455-468. 1 pl. 1939.—In the presence of a standard dose of growth substances, increased conc. of certain C compounds depresses perithecium formation. With glucose or fructose, the optimal conc. is low, and above that point the decline is rapid. Growth of mycelium continues to increase until a high conc. of the sugar is reached. With lactose, maltose, arabinose or starch, the optimum is at a higher conc., above which the decline is more gradual; with sucrose, growth and fruiting are scanty at low concs., and both increase to optima at high concs.; with inulin, mannitol, and galactose, there is little response in growth or fruiting over a wide range of concs. The concs. of glucose, fructose, lactose, and sucrose which are optimal for perithecium production are raised by increased addition of growth substances. With low cones of sucrose, inversion takes place too slowly to give at any time an adequate conc. of hexose sugars in the culture medium; with higher concs. inversion takes place at such a rate that a favorable cone, of reducing sugars is maintained for much of the growing period. The amount of C consumed per unit of dry weight produced is much greater on a medium with sucrose than on one with an equal quantity of glucose. This suggests important differences with respect to respiration. The differences between the capacities of glucose and fructose media for stimulating sporulation can be partly bridged by supplying the glucose from time to time, so that an even low conc. is maintained. The superior value, for sporulation, of high cones. of sucrose lies in part in the maintenance, through enzymatic inversion, of a fairly uniform low conc. of hexose sugars. The high efficiency associated with growth on glucose media is shown whether the glucose be added at the beginning or in instalments, Mixtures of glucose and fructose are equivalent to the same total amts. of either sugar used alone. Sucrose, after inversion by HCl or invertase, behaves similarly to corresponding amts. of glucose or fructose or of a mixture of the two. The difference between sucrose and glucose with regard to sporulation and growth can probably be fully explained only when account is taken of the labile forms of hexose sugars which are formed as first products in inversion.—Auth. summ.
15762. LONG, J. H. Reducing sugars in the strawberry

15762. LONG, J. H. Reducing sugars in the strawberry plant. Proc. Amer. Soc. Hort. Sci. 36: 495-497. 1938(1939).—
The percentages and total amts. of reducing sugars in the strawberry plant as detd. by macrochemical methods at frequent intervals throughout a period of 2 years are given. There are indications that the roots and stems act as storage organs during the season of active photosynthesis, and that there is a rapid depletion during the period of fruiting. Reducing sugars constitute from 40 to 70% of the total sugars.—J. H. Long.

15763. MACFARLANE, MARJORIE GIFFEN. The phosphorylation of carbohydrate in living cells. Biochem. Jour. 33(4): 565-578. 1939.—In the normal "resting" yeast cell hexosediphosphate is present in small amts., approx. I mg. of P per 100 g. yeast. During the fermentation of hexoses by living yeast the organic P present in the yeast is increased by about 30 mg. of P per 100 g. yeast, of which at least 10 mg. of P are hexosediphosphate. This ester was identified and estimated by the formation of the crystalline phenylhydrazine salt of 6-phosphoglucosazone. When the fermentation of sugars was inhibited by the addition of NaF, phosphoglyceric acid in amount equal to 7 mg. of P per 100 g. was isolated from the fresh yeast.—From Auth.

157.64. MARSH, J. T., and F. C. WOOD. An introduction to the chemistry of cellulose. With foreword by KENNETH LEE. xv+431p. 111 fig. D. Van Nostrand Co., Inc.: New York, 1939. Pr. \$7.50.—In part I the occurrence and distribution of the various types of cellulose—cotton, flax, ramie etc.—, methods for their purification, and their general chemical, colloidal, physical, optical, electrical and mechanical properties are discussed. Part II deals with the dispersion of cellulose in strong bases (including merceritation), in salt solns., in specific reagents such as cupramnonium hydrate; conversion into viscose and properties

of cellulose regenerated from its dispersion. Part III is taken up with a presentation of the preparation, properties and hypotheses as to the mechanism of the reactions involved in the modification of cellulose to hydrocellulose and oxycellulose. Part IV is the most extensive section of the book covering about \(\frac{1}{3} \) of the total pages. The preparation and properties of derivatives of cellulose are described. These include esters of inorganic and organic acids, mixed esters, ethers, mixed ethers, amino cellulose and cellulose xanthate. Part V is devoted to the constitution and structure of cellulose. After an historical development of the constitution of cellulose as a molecular chain the authors discuss various determinations of the molecular weight of cellulose with special reference to the work of Standinger. A further chapter is devoted to the chain molecule hypothesis and the evidence from modified cellulose and the final chapter on the molecular structure of cellulose presents the results of X-ray examination, the models of Mark and Meyer and the micellar theory.—H. N. Glassman.

15765. O'DWYER, MARGARET HELENA. The hemicelluloses of the wood of English oak. IV. The structure of hemicellulose A. Biochem. Jour. 33(5): 713-717. 1939.—When oak sapwood hemicellulose A, from which the constituent anhydroglucose residues have been removed, or oak heartwood hemicellulose A is submitted to prolonged hydrolysis by means of takadiastase at 38-40° and pH 4.5, it is completely converted into xylose and a soluble polysaccharide (I) having $[a]_D^{50°} = -51.2°$ in water (c=2), 3 parts by weight of the former to 2 of the latter being produced at all stages of the hydrolysis. Oak sapwood hemicellulose A after removal of anhydroglucose residues is therefore chemically identical with oak heartwood hemicellulose A. The soluble polysaccharide (I) gives rise, on hydrolysis with dilute sulphuric acid, to xylose and a xylonomethylaldobionic acid, and the recurring structural unit consists of six xylose residues and one methylhexuronic acid residue.—M. H. O'Dwyer.

15766. WYSS, ORVILLE, R. H. BURRIS, and P. W. WILSON. Occurrence and significance of oxalacetic acid in plant tissues. Proc. Soc. Exp. Biol. and Med. 40(3): 372-375. 1939.—The colorimetric method of Szent-Györgyi and Straub proved unsatisfactory for the estimation of small quantities of oxalacetic acid in plant tissues, because of the development of an interfering color. The manometric method of Ostern was not subject to these difficulties, and 10γ of oxalacetic acid per ml. of plant sap could be detected and 25γ per ml. could be quantitatively recovered. No oxalacetic acid could be demonstrated in the sap of pea plants even when precursors of oxalacetic acid, e.g., fumaric and malic acids, were added. There was no fixation of N by excised nodules in the presence of added oxalacetic acid. -R. H. Burris.

NITROGEN METABOLISM

15767. SIDERIS, C. P., B. H. KRAUSS, and H. Y. YOUNG. Distribution of different nitrogen fractions, sugars and other substances in various sections of the pineapple plant grown in soil cultures and receiving either ammonium or nitrate salts. Plant Physiol. 14(2): 227-254. 1939.—The outstanding feature of these studies was the abundance of nitrate in the stem and in the non-chlorophyllous basal leaf tissues of the leaves of plants supplied with ammonium. Similar plants grown previously in nitrate-free solution cultures with ammonium salts contained no nitrate in their tissues but great amounts of amino N. The nitrate found in the tissues of the plants supplied with ammonium in the present studies was derived from ammonium which had been oxidized in the soil by microorganisms. When nitrate is absorbed by the roots from soln. cultures it is transported in its native state through the tissues of the roots and stem to the chlorophyllous parts of the leaves wherein it is readily assimilated. The oxidation of ammonium salts added to soils is indicated by the presence of abundant nitrate in the non-chlorophyllous tissues of the plants. The protein content of the leaves of plants of the nitrate series was slightly greater than that of those of the ammonium group. The soluble organic N was higher in the plants of the ammonium is assimilated very quickly, inorganic N consisted mostly of nitrate; it was high in the stem and in the non-

chlorophyllous sections of the leaves of the plants of both series of soil cultures.—In contrast with the results of preceding studies, the chem. composition of plants grown in non-sterilized soil and receiving either ammonium or nitrate salts as sources of N varies very little, because of the conversion of ammonium to nitrate by the nitrifying bacteria of the soil.—C. P. Sideris.

ORGANIC ACID METABOLISM

15768. PUCHER, GEORGE W., ALFRED J. WAKEMAN, and HUBERT BRADFORD VICKERY. Organic acid metabolism of the buckwheat plant. Plant Physiol. 14(2): 333-340. 1939.—The chief organic acid present in buckwheat plant tissue is oxalic acid, malic acid is present in smaller amounts and citric acid in minor proportions, the three making up about 90% of the organic acidity of the leaf and 72% of the stem. During illumination, photosynthesis is active and organic acids increase although the pH of the sap decreases. In the later part of the day malic acid is utilized and there is an increase in the group of unknown organic acids. The pH increases to approximately the early morning level. During the night there is a small increase in total organic acids and an interconversion of unknown acids into one or more of the known acids takes place. Interpretation of the changes in pH of the sap cannot be made in the absence of specific information regarding the individual organic acids. Such factors as the absorption of inorganic ions by the roots, the distribution of organic and inorganic ions within the tissues and photosynthesis all play a part in influencing the changes in acidity that occur, in addition to the changes in the organic acids themselves.—H. B. Vickery.

15769. WOLF, JOHANNES. Beiträge zur Kenntnis des Säurestoffwechsels sukkulenter Crassulaceen. IV. Beo-bachtungen über Gehaltsschwankungen von Gesamt-, Apfelund Zitronenensäure. Planta 29(2): 314-324. 3 fig. 1939.— Malic and citric acid as well as total acids show the typical diurnal variations characteristic of Crassulaceae. The process of acid formation and accumulation passes through 3 stages for which the ratio of extra O2 intake over total acid increase

may be characteristic.—B. R. Nebel.
15770. WOLF, JOHANNES. Beiträge zur Kenntnis des Säurestoffwechsels Sukkulenter Crassulaceen. V. Mikrorespiratorische Untersuchungen an Blattgewebe von Bryophyllum calycinum. Planta 29(3): 450-467. 1939.—Three phases of acid metabolism must be distinguished: I, that of increasing, II, that of stationary and III, that of decreasing acid content. During I betaxine does not influence the gaseous metabolism. Addition of pyruvate lowers the respiratory quotient by reducing the CO₂ production. This effect can be counteracted by Vitamin B₁. Yeast extract has a similar effect as pyruvic acid. Dioxyacetone and glycerol aldehyde raise the R.Q. faster than phosphate soln. alone. Hexosediphosphate alone does not influence the gaseous metabolism. Fuoride decreases CO₂ intake. In presence of fluoride, pyruvate does not lower the R.Q. this being at 1.2 as of pyruvic acid. Monoiodoacetic acid acts similarly cutting the extra O2 intake but raising the extra CO2 output. During II betaxine has no influence. Pyruvate raises the R.Q., betaxine lowers it in presence of pyruvate. During III pyruvic acid lowers the R.Q. regardless of the presence of betaxine. Fluoride decreases the CO2 output with and without pyruvinate.—B. R. Nebel.

LOW TEMPERATURE, HARDINESS

15771. HARVEY, R. B. Factors that influence the injury to wheat from freezing. Minnesota Agric. Exp. Sta. Misc. Paper No. 388; also in Northwestern Miller 197: 22-23. 1939.—A popular discussion of the factors that influence injury of wheat in heading stages to clarify predictions of damage to the crop. New data on injurious temps. and

the localization of injury are given.—R. B. Harvey. 15772. IRELAND, J. C. Seasonal sugar variations in alfalfa. Plant Physiol. 14(2): 381-384. 1939.—7 vars. of alfalfa are compared by expressing the sap, reading the per-centage of soluble solids with a hand sugar refractometer. The conc. varies inversely as the temp. of the soil. Winter killing in alfalfa plants is proportional to the uniformity of the conc. of soluble solids in the crown.—J. C. Ireland.

15773. LEVITT, J. The relation of cabbage hardiness to bound water, unfrozen water, and cell contraction when

frozen. Plant Physiol. 14(1): 93-112. 1 fig. 1939.—Calorimetric detas, were made on hardened plants at -5.6°C, on unhardened ones at -5.6° and -2.1°C. The hardened unhardened ones at -5.6° and -2.1° C. The hardened plants suffered 50% killing at the former, the unhardened 85% killing at the latter temp. A knowledge of the total moisture and the freezing point allowed a separate calculation of osmotically and non-osmotically bound water on the assumptions that the latter does not act as a solvent, and that the plant sap is an ideal soln. The results oppose the dehydration theory of frost injury, for the unhardened plants contained more total unfrozen water and more nonosmotically bound water at -2.1°C than did the hardened at -5.6°C. Less ice was formed per g. fresh wt. in the unhardened than in the hardened. This opposes the pressure theory. In agreement with the theory of protoplasmic strain, the cells of hardened plants were contracted to 1. those of unhardened to only 1 of their normal volume at the above temps., indicating a greater resistance to strain in the hardened state. Rate of freezing and thawing did not alter the injury to unhardened plants. Slow freezing reduced the injury to hardened plants, but slow thawing did not. These facts favor the assumption that extracellular ice occurred in the unhardened in all cases. In the hardened plants intracellular freezing may have occurred when freezing (at the lower temp.) was rapid, and the cells may have been capable of surviving an even more severe contraction under conditions of slow freezing than mentioned above. J.

15774. SHIRLEY, HARDY L., and LLOYD J. MEULI. The influence of soil nutrients on drought resistance of twoyear-old red pine. Amer. Jour. Bot. 26(6): 355-360. 1939.-Tests of resistance to artificial drought were made on 2year-old red pine transplants cultured during their 2d growing season in pots and nursery beds filled with washed sand to which 3 levels of N, 3 levels of P, and 2 levels of water were supplied in factorially designed expts. Drought resistance decreased consistently with increase in N provided other nutrients were present in adequate amts. With phosphate and K both absent, a high N content, so high in fact that it was toxic, produced plants more resistant than those supplied N in moderate amts. Daily watering reduced the drought resistance of nursery-grown plants supplied no N; but in the beds supplied N at high conc., this effect was offset by leaching of N from the porous sand. Phosphate supply also influenced drought resistance but this influence was less marked than that due to water and N, and varied with N conen. With no N present an increase in phosphate increased drought resistance. With N present this effect persisted but was much less definite. The combination of N and phosphate necessary to produce good growth and at the same time a high degree of drought resistance was not determined.—H. L. Shirley.

15775. SISAKIAN, N., i A. KOBIAKOVA. Napravlennost' fermentationogo deistvifa kak priznak zasukhoustoĭchivosti kul'turnykh rastenii. II. Napravlennost' deĭstvifa proteaz u zasukhoustoichivykh i nezasukhoustoichivykh sortov pshenits. [The direction of enzymatic action, as an index of drought resistance in cultivated plants. II. The direction of protease action in drought-resistant and non-resistant strains of wheat.] [In Russ. with Eng. summ.] Biokhimia. 3(6): 796-803. 1939.—In withered leaves the synthetic action of the proteases was lowered and their hydrolytic action increased. Drought-resistant strains retained their synthetic activity when water loss amounted to 50% of the original weight of leaves; non-resistant strains lost activity when the water loss was 20-40%.—E. K. Johnson.

PIGMENTS

15776. RUTZLER, JOHN E. Jr. The precursors of the anthocyanins of autumn foliage. Jour. Amer. Chem. Soc. 61(5): 1160-1163. 1939.—A survey of the foliage of 86 spp. of plants was made at Ithaca, New York, in the autumn of 1938 to determine the distribution of leuco-anthocyanin and flavone as precursors of anthocyanins. The flavone was the probable precursor in 38% of the cases, a leuco-anthocyanins in 14% of the cases and both were present in quantity in 48% of the cases. The various spp. of any one genus were not always homogeneous with respect to their precursor types.-H. N. Glassman.

ENZYMES

15777. SAPOZLINIKOVA, K. V., i N. F. VOLKOVA. O fermentnom sinteze polisakharidov v avtoliticheskikh smessakh. [Enzymatic synthesis of polysaccharides in autolytic mixtures]. (In Russ. with Eng. summ.) Biokhimiia 3(6): 804-812. 1938.—In growing lupine plants carbohydrase activity is mainly synthetic, in adult plants, hydrolytic. Monosaccharides decrease gradually in both the autolytic mixtures and in water extracts, due to formation of polysaccharides of the maltose type. Infiltration methods

give similar results.—E. K. Johnson.

15778. TAMIJA, HIROSHI, und HIDEO KUBO. Zur Frage der Nichtidentitat der Cytochromoxydase mit dem sauerstoffübertragenden Ferment von O. Warburg. Acta Phytochimica [Tokyo] 10(2): 317-334. 1938.—In the case of Acetobacter and yeast it was shown that cytochrome oxidase is not identical with Warburg's oxygen-transferring ferment. The cytochrome oxidase is sensitive to CN; the oxygentransferring ferment is sensitive to CO but resistant to CN.—

15. M. Doty.

15779. YOSHIMURA, FUJI. The action of some heavy metals upon the production of catalase in Aspergilli. [In Jap. with Eng. summ.] Bot. Mag. [Tokyo] 53(627): 125-138. 1939.—The effect of Fe. Zn. Cu and Mn on the catalase activity (oxygen production per unit weight of mycelium) of Aspergillus oryzae and some other Aspergilli was studied. The culture soln, was purified by the adsorption procedure using calcium phosphate. Catalase activity was greatly increased with increase in Fe content. Zn, Cu and Mn were favorable in low conc. The actions of Mn and sometimes of Cu were indirect and due to the inhibition of the spherical cell formation and acceleration of conidial production, which generally counteracts the catalase activity. With increased Fe cone, the absence of Mn did not diminish the catalase activity. Low pH decreased catalase activity. Addition of the heavy metals to the enzyme preparation, in the concs. used in the culture soln., had no direct influence on its activity.-Auth. summ.

TROPISM, MOVEMENTS

15780. VIEHMANN, HEINRICH. Untersuchungen über die chemotropische Wirkung organischer Säuren. Jahrb. wiss. Bot. 87(2/3): 408-435. 1938.—Formic and acetic acid pastes of different cones., applied on one side of intact seedlings of Avena, Helianthus or Lupinus, brought about positive responses as a result of their growth-retarding action. If pieces of the hypocotyl of Helianthus or Lupinus action. are stroked with such acid paste, then placed on agar blocks, and the latter subsequently tested on decapitated Avena seedlings, tropic responses result. These responses are independent of the age of the seedlings treated or the conc. of the acid paste. These positive responses to the agar blocks seem to be due to growth-retarding substances released from the hypocotyls under the influence of the acid.—J. H. Priestley.

TOXICITY

15781. NAKAMURA, HIROSI. Über die Kohlensaureassimilation bei niederen Algen in Anwesenheit des Schwefelwasserstoffs. Acta Phytochimica [Tokyo] 10(2): 271-281. 2 fig. 1938.—In the lower algae, Pinnularia and Oscillatoria, respiration and CO₂ assimilation are not appreciably affected by the presence of H₂S. In the presence of H₂S the chemical phase of photosynthesis consists of a reaction between the H₂O₂ and the H₂S with the formation of H₂O and S.-.M. H. Thornton.

· 15782. NAKAMURA, HIROSI. Über den Einfluss der Blausaure auf die Photosynthese von Scenedesmus. Acta Phytochimica [Tokyo] 10(2): 313-316. 2 fig. 1938.—HCN in conen. of 10⁻⁴ M reduced O₂ output and photosynthesis of Scenedesmus almost completely. There is close correlation between reduced photosynthesis and catalase poisoning by HCN, hydroxyl amine, H₂S and mono iodo acetic acid.—D. M. Doty.

GRADIENTS

15783. HORSFALL, F. Jr., and C. G. VINSON. Apical dominance in shoots and proximal dominance in roots as related to structural framework of the apple. Missouri Agric. Exp. Sta. Res. Bull. 293. 1-23. 16 fig. 1938.—Immersion of unbranched yearling Jonathan trees in aqueous solns, of thiourea, followed by different disbudding treatments, re-tarded the development of distal buds so that the upper branches were not dominant the 1st year. The cutting-back of 4-year-old Delicious trees resulted, in some cases, in the lower laterals' outgrowing the terminal. Insufficiency of water and light reduction to 380 foot candles or the development of several shoots favored inhibition of laterals in cut-back trees. The more rapid enlargement of the trunk than of the young scaffold branches apparently forced the widening of the angle while the tissues of the lateral were widening of the angle while the tissues of the lateral were still soft. Adhesive tape wound around the trunk and a tender side shoot reduced markedly the angle between the two. Spiral girdles on 1-yr.-old scaffold branches resulted in a changed direction of the longitudinal axis from parallel with the limb to parallel with the spiral. Soaking sweet potato roots in thiourea solns, overcame proximal dominance so that both the 1st and 2d crops of slips developed over the entire surface of the potato.—Courtesy of Exp. Sta. Rec.

APPARATUS, METHODS

15784. BARR, C. G. Application of the ceric sulphate method in the analysis of carbohydrates in the roots of Lepidium and Convolvulus. Plant Physiol. 14(2): 285-296. 1939.—In the determination of sugars in root extracts of L. draba var. repens, better results could be obtained by a volumetric ceric sulfate method than by the standard Cu reduction method, (modified Munson-Walker method). Determinations of the sucrose content of *C. arvensis* roots made by the 2 methods yielded equivalent values. The ceric sulfate method was satisfactory in the determination of polysaccharides of the roots of both plants.—C. G. Barr.

of polysaccharities of the roots of both plants.— C. Dari. 15785. BILLIMORIA, M. C. Methods of estimating amino, ammonia and nitrate nitrogen in plant extracts. Proc. Leeds Phil. and Lit. Soc. Sci. Sect. 3(8): 481-487. 1938.—The determination of amino N by formol titration. and ammonia N by distillation with Mg(OH)2 in unclarified plant extracts gives results that agree with those obtained when the solns, are clarified with Pb acetate and the Pb is removed with Na₂HPO₄. Clearing the plant extract is necessary in order to obtain accurate results when nitrate N is to be detd.—H. J. Harper.

15786. EMMERT, E. M. Determination of ammonia and

amide nitrogen in connection with the chlorate method for nitrogen in plant tissues. Plant Physiol. 14(2): 341-349. 1939.—The rapid chlorate method for total N oxidizes all the N in the samples to HNO₃, with the exception of ammonia and amide N. By making a rapid Nessler test on an aliquot of the same oxidized soln, as used for the phenoldisulfonic acid test for HNO₃ it was found possible to determine total N accurately by adding the HNO₃ and ammonia and amide N found. When large amts, of amide were present extra refluxing was necessary. The method divided the N in asparagine evenly into amino and amide N showing that the method enables an exact division into 2 important groups to be made. Small amts. of ammonia N important groups to be made. Small amis, of ammonia N were oxidized by chloric acid in pure ammonia salts especially in NH.Cl. The presence of sugar stopped this, however, showing that in the presence of organic matter exact division of N into the 2 groups was made. By prolonging the chlorate oxidation to 1 hr. or more all the N could be converted to HNO₃. The N in pyridine was accurately dotd by pyrelenged exidation with chloric acid. curately detd, by prolonged oxidation with chloric acid.— E. M. Emmert.

15787. MOON, F. E. The quantitative extraction of carotene from grass. Jour. Agric. Sci. 29(2): 295-301. 1939.

The author discusses the various methods devised for the separation of carotene from grass and other green vegetable material. Most methods involve a preliminary determination of total carotenoids, followed by a phase separation of the 2 pigments. This phase separation considerably limits usefulness of such methods and to dispense with it a direct extraction of carotene is necessary. For this purpose petroleum ether may be used in the presence of alcohol. The use of hot alcoholic potash for the disintegration of leaf material and separation of chlorophyll leads to an undesirable precipitate which hinders subsequent extraction. The author discusses in detail a method employed to overcome this difficulty-saponification with hot aqueous

potash followed by filtration and extraction of the grass residue with alcohol. A comparison of the results obtained with those from 2 other methods has been made by a colorimetric determination of the extracted pigment. The variance and standard error are smaller than those for the other 2 methods and the results obtained are reproducible with considerable accuracy.—T. D. Jarvis.

with considerable accuracy.—T. D. Jarvis.

15788. REILHES, R. Sur la valeur, pour l'histochimie végétale, des méthodes utilisées en histochimie animale pour la mise en évidence du glycogène. Compt. Rend. Soc. Biol. 130(11): 1047-1049. 1939.—The application of the methods of Best, Bauer and Errera for demonstration of glycogen in plant tissues is described.—H. Simons.

15789. ROY, WALLACE R., and AUSKER E. HUGHES. Application of the Scales method to determination of sugar in plant juices and tissues. Jour. Assoc. Offic. Agric. Chem. 21(4): 636-645. 1938.—This iodometric procedure is compared to the standard method of Munson and Walker utilizing both pure sugar solns. and fruit juices, and shows the same degree of accuracy for both methods. Advantages claimed for the modified procedure are its rapidity, ease of handling, accuracy, and adaptability to the determination of small amts. of sugars (4-18 mg.).—J. E. Webster.

15790. SHULL, CHARLES A., and S. P. SHULL. Determination of constants for curves of water absorption by dry organic substances. Plant Physiol. 14(2): 351-357. 1939. —The method of obtaining appropriate constants for curves of the type y=a log (bx+1)+c is presented in detail, with an example taken from previously published data.— $C.\ A.\ Shull.$

STOMATA

15791. DIACHUN, STEPHEN, and W. D. VALLEAU. Relation of stomatal opening to water soaking of tobacco leaves. Amer. Jour. Bot. 26(5): 347-351. 2 fig. 1939.—Susceptibility of tobacco leaves to water-soaking by a stream of water was determined largely by the degree of opening and condition of stomata. During the day stomata were open, and leaves could be water-soaked easily and rapidly; at night, stomata usually were closed or nearly closed, and

leaves water-soaked only with difficulty. Wilting leaves and leaves shaded naturally or artificially water-soaked slowly, and stomata were closed or nearly so. Middle leaves of Burley plants water-soaked more rapidly than tip leaves or basal leaves. Stomata were not fully developed on tip leaves. On basal leaves stomata were always closed or nearly so, some being deformed with degenerating guard cells. The method described in this paper or some modification of it may be used as an indirect method for studying stomatal behavior.—Auth. summ.

REGENERATION

15792. WILSON, ORVILLE T. Regeneration of roots from transplanted cotyledons of alfalfa, Medicago sativa. Amer. Jour. Bot. 25(6): 429. 1 fig. 1939.—Cotyledons of Medicago sativa root freely when transplanted to soil and given the treatment usually accorded to cuttings.—O. T. Wilson.

MISCELLANEOUS

15793. PERSONIUS, CATHERINE J., and PAUL F. SHARP. Adhesion of potato-tissue cells as influenced by pectic solvents and precipitants. Food Res. 4(3): 299-307. 4 fig. 1939.—Extensive decrease in cell adhesion, as followed quantitatively by tensile-strength measurements, resulted when potato tissue was held at 65°C in solns. of ammonium oxalate, Na citrate or NaF or in lactic acid solns. of pH 3 or less; a small decrease was observed with tissue held in water, potato juice or 0.2 N solns. of NaCl or KCl; little or no decrease resulted with solns. of BaCls, CaCls, MgCls or SrCls. 0.2 N solns. of aluminum, cupric or ferric chlorides gave decided decreases in cell adhesion probably due to the acidity of the solns. Tissue in which cell adhesion had been decreased by heat or chemical treatment, showed an increase in tensile strength after being held in solns. of CaCls. The expts. indicate the pectic nature of the intercellular cementing material of potato tissue and that the tissue softening characteristically obtained during cooking results from the extensive decrease in cell adhesion which is influenced markedly by the cation environment.—Authors.

PHYTOPATHOLOGY

FREEMAN WEISS, Editor

(See also in this issue Entries 14986, 15144, 15405, 15419, 15439, 15441, 15447, 15448, 15449, 15454, 15457, 15458, 15468, 15470, 15471, 15535, 15589, 15607, 15654, 15697, 15699, 15727, 15737, 15753, 15761, 15771, 15791, 16000, 16025)

DISEASES CAUSED BY FUNGI

15794. BAINES, R. C. Phytophthora stem rot of Viscaria. Phytopath. 29(7): 652-654. 1 fig. 1939.—A stem rot of Lychnis viscaria caused by Phytophthora cactorum is described. The fungus invaded all of the tissues of the stem. The causal fungus was non-pathogenic on Grimes Golden apple trees and thus differed in pathogenicity from the P. cactorum frequently isolated from apple trees and fruit in Indiana—R. C. Raines

Indiana.—R. C. Baines.

15795. BARTHELET, J. Recherches sur la mortalité des rameaux de groseilliers. Ann. Épiphyties et Phytogénetique 4(3): 495-512. 4 pl., 6 fig. 1938.—Deals principally with a dieback of Ribes spp. caused by Eutypa lata var. ribis. Other more or less secondary fungi attacking Ribes spp. are also described and figured, including Diatrype ribis found and branches of grosephory. W. V.

on dead branches of gooseberry.—W. V. L.

15796. BEAUMONT, A., and W. BUDDIN. Notes on Fusarium avenaceum attacking the leaves of tulips in glasshouses. Trans. Brit. Mycol. Soc. 22(1/2): 113-115. 1938.—Small lesions, up to 1 cm. diam. occurring on leaves of forcing tulips produced masses of Fusarium spores when incubated. The fungus was identified as F. herbarum var. tuberculoides (F. avenaceeum). Several other instances of the disease were observed, all on tulips forced under glass. Observations and inoculation exps. showed that high humidity and temp. 70° F or higher were prerequisite for infection. The source of the Fusarium was apparently the wheat straw used to cover the flats during the rooting period.—F. Weiss.

used to cover the flats during the rooting period.—F. Weiss. 15797. BUCHANAN, T. S. Blister rust damage to merchantable western white pine. Jour. Forest. 36(3): 321-328. 1 fig. 1938.—In Idaho and British Columbia, Cronartium

ribicola may infect Pinus monticola stands of all ages, attacking trees up to 188 ft. in ht. Estimated periods between infection and serious damage range from 5 yrs. for smaller trees up to 30 yrs. or more for larger ones. New infections may shorten these periods. Under conditions most favorable to infection, 50% of merchantable timber may be damaged from a short period of exposure to infected Ribes.—A. G. Hall.

15798. DAY, W. R. Root-rot of sweet chestnut and beech caused by species of Phytophthora. II. Inoculation experiments and methods of control. Forestry 13(1): 46-58. 1939 .-This paper is concerned with root-rot of Castanea sativa and Fagus sylvatica caused by P. cambivora, P. syringae, and P. cinnamomi. The host range of these fungi is indicated and the course of development and general symptoms of disease described. Each of the parasites causes a disease of exactly similar appearance. Phytophthora root-rot is associated with moist water-retentive soils and is especially serious when the depth of well-drained soil is shallow and the drainage in the subsoil impeded. The disease has not been found on light, easily drained loams with completely free drainage in the subsoil. Similar soils with impeded drainage at a depth of 2 feet or more have also remained free from infection although adjacent to infected soils. Inoculation expts. indicate that C. sativa, C. crenata, and F. sylvatica are all susceptible to all 3 spp. of parasites. The two latter spp. are rather less susceptible to P. cinnamomi than is C. sativa, while C. crenata is possibly the more resistant to P. syringae. The evidence from the field is that F. sylvatica is less susceptible than C. sativa. C. crenata is not grown in England but has proved to be

highly resistant in France and elsewhere. Plants raised in England for trial purposes have proved to be susceptible to frost injury. Their resistance in the field to root-rot is not yet known. The various methods of controlling the disease are discussed. The use of resistant sorts of chestnut is the most important method abroad, and, if a suitable type of tree can be found, may prove to be of value in England. In the meantime the cultivation of chestnut under soil conditions which favor the development of infection should

conditions which favor the development of infection should be avoided and this genus confined to the drier and more freely drained non-calcareous soils.—Author's summary.

15799. EVANS, M. M., and R. F. POOLE. Some parasitic fungi harbored by peanut seed stock. Jour. Elisha Mitchell Sci. Soc. 54(2): 190-191. 1938.

15800. FOKIN, A. D. Meteorological conditions favoring mass multiplication of Sclerotinia graminearum Elen. [In Russ.] Zashchita Rastenii ot Vreditelei (Defence des Plantes) [USSR] 18: 113-120. 1939.

15801. FRESA, ROBERTO. La presencia de "Entamo-

15801. FRESA, ROBERTO. La presencia de "Entomosporium maculatum," parasito del manzano, en la delta del Parana. [The presence of leaf blight of the apple in the Parana delta.] Rev. Argentina Agron. 6(1): 53-56. 1939.— This malady, due to E. maculatum, was first observed on the leaves of apple trees in Argentina in Nov. and Dec., 1937. It had previously been observed on quinces and pears. A description of the disease and its causative agent are given. Since the symptoms of this disease are similar to those of Sphaeropsis malorum, cross inoculation will be necessary to establish the pathogenicity of each.—J. W. Gilmore.

15802. GODOY, ERNESTO F. El oidium del tomate.
[Tomato mildew.] Rev. Argentina Agron. 6(1): 49-52. 3 fig.

1939.—This malady, due to a species of Oidium, was first noticed on forced tomatoes in the district of Jujuy in July, 1938. The characteristics of the disease and of the causative

agent, and remarks on control, are given.—J. W. Gilmore. 15803. HADDOW, W. R., and M. A. ADAMSON. Note on the occurrence of needle blight and late fall browning in red pine (Pinus resinosa Ait.). Forest. Chron. 15(2): 107-110. 1 pl. 1939.—A summer blight and a fall browning of the current season's foliage of red pine have been observed since 1932 at several locations in Simcoe and Durham Counties, Ontario. Only young trees in close plantations are attacked. Both affections appear to originate from the ovipositing of a gall midge (Cecidomyidae) at the base of the needles. If the wounded needles are infected with the fungus Pullularia pullulans before they are mature, needle blight develops; if not, the midge larvae mature and cause the fall browning. So far, no trees have been killed.—W. N.

15804. JAKOVLEV, A. G. A study of the biology of Sclerotinia graminearum on winter cereals. [In Russ. with Eng. summ.] Zashchita Rastenii ot Vreditelei (Defence des Plantes) [USSR] 18: 109-112, 1939.—Germination of sclerotia is possible after their physiological after-ripening in summer. Immature sclerotia shallowly placed under the surface of the soil decay rapidly. Germinating sclerotia show positive phototropism; when light is deficient, and under short day conditions, the apothecium is incompletely leveloped. Under natural conditions the apothecia are right yellow and have a short stipe; they bear 8 asco-pores in each ascus. The sclerotia germinate best in moist iollows, in weedy areas etc.; intense development of the ungus was observed in acid soils.—From Eng. summ. by F.

15805. LIN, K. H. The number of spores in a pycnidium f Septoria apii. Phytopath. 29(7): 646-647. 1939.—The pores of 9 pychidia were counted separately by the aid of a counting field." The average number of spores in a yenidium was 3675. The average number of pycnidia in a yenidium was 56. It was setimated if only 10 primary lesions. eaf spot was 56. It was estimated if only 10 primary lesions ccurred in a seedbed there would be possibly 1½ million pores available as secondary inoculum before the plants were transplanted to the field.—K. H. Lin.

15806. MOORE, W. C. New and interesting plant diseases. Trans. Brit. Mycol. Soc. 22(3/4): 264-267. 1 pl. 1939.—
ngular leaf spot of apples (Phyllosticta angulata) and leaf lotch of Aquilegia reported from England, descr. and il-

strated.—G. W. Martin.

15807. OORT, A. J. P. Inoculation experiments with ose smuts of wheat and barley (Ustilago tritici and U.

nuda). Phytopath. 29(8): 717-728. 2 fig. 1939.—For the inoculation of wheat and barley with loose smut, Moore's method, with some modifications, was applied. Considerable improvement was obtained by putting into the inocula-tion chamber 4 heads instead of one. When 2 persons are working together the speed can thus be increased up to 80 heads per hour for wheat and 50 for barley, including selecting and marking of heads. In this respect Moore's method surpasses the Halle method. The apparatus and experimentation are described. In contrast to the experiences of others, the loss of plants at emergence and during winter was only slight. For wheat the loss at emergence and during winter amounted to an average of 10%, regardless of the period of inoculation and of concentration of spore suspension. In barley there was some relation between the loss of plants and the period of inoculation or the conc. used. However, the total maximum loss did not yet amount to 20%. The optimum period for inoculation lasts only a few days and during anthesis. The spore inoculum has a maximum effect both for wheat and for barley in a conc. of 1 g. and 0.1 g. spores per liter of water respectively. With concs. of about 0.001 g. spores per l. water, or about 10 spores per c.mm., a fairly good infection still takes place. With an increasing number of pump strokes from 2 to 10, the number of smutted plants increases (expts. only with wheat). Whether the maximum is already reached with 10 pump strokes is not certain, but for practical reasons a greater number is not recommended.—A. J. P. Oort.

15808. PLESSIS, S. J. du. Une maladie de la vigne spéciale à l'Amérique du nord et à l'Afrique du sud? Rev. Vitic. 90(2328): 114-120. 1939.—Fusicoccum viticolum.

15809. SOLKINA, A. F. A study of the cycle of development of the fungus Sclerotinia graminearum Ellen. [În Russ. with Eng. summ.] Zashchita Rastenii ot Vreditelei (Defence des Plantes) [USSR] 18: 100-108. 1939.—Ascospores were sown on a nutrient medium on Oct. 26; in 6 days mycelium was observed, apothecia in 4 mos. Microconidia appeared contemporaneously with sclerotia; their function is not clear. Keeping sclerotia 7-10 mos. in dry condition impairs their germination. Germinating sclerotia withstand drying to air-dry condition for 2½ mos. and then proceed normally to apothecium formation upon the restoration of moist conditions. The ascus stage occurs in autumn depending on a favorable combination of moisture and temp. Ascospore germination occurs best at 3-16° C, and fails at 30°. Freezing to -3° C does not kill these spores. Dispersion, with partial germination, of ascospores occurs in autumn. The ascus stage resembles that of S. borealis but differs in essential characteristics.—From Eng. summ. by F. Weiss.

15810. THIEL, ALBERT F. The overwintering of urediniospores of Puccinia graminis tritici in North Carolina. Jour. Elisha Mitchell Sci. Soc. 54(2): 247-255. 2 fig. 1938,-Germination tests of urediniospores made during the 3 winters of 1935 to 1938 showed in each year a high percentage of viable spores during Oct., a sharp drop in urediniospore viability during Nov. and Dec., and no viable urediniospores present by Feb. The primary inoculum of stem rust in N. Carolina apparently comes from a northward migration of urediniospores from states to the southwest.—A. F. Thiel.

15811. TYLER, LEON J., K. G. PARKER, and L. L. PECHUMAN. The relation of Saperda tridentata to infection of American elm by Ceratostomella ulmi. *Phytopath.* 29(6): 547-549. 1939.—Working in a greenhouse, 2- to 4-yr.old budded elms (Ulmus americana) in pails were inoculated with C. ulmi through wounds made by the common elm borer, S. tridentata. Infection was obtained whether inoculation was by C. ulmi-infested beetles or by atomizing wounds, made by surface-disinfested beetles, with a water suspension of spores. Infected trees did not wilt and detailed examination showed that invasion by the fungus was not extensive.—L. J. Tyler.

15812. WEBER, GEORGE F. Web-blight, a disease of beans caused by Corticium microsclerotia. Phytopath. 29 (7): 559-575. 7 fig. 1939.—Rhizoctonia microsclerotia was discovered in Florida in 1932 causing a destructive disease of beans. Epiphytotics in bean fields occurred at scattered locations in the state during the warm, rainy summer periods, at which times extensive plantings were total losses. The aerial parts of the host alone were attacked and killed. The disease designated as web-blight has not previously been reported on beans in the U.S. It causes brown spots on the foliage rapidly killing it. The pods become spotted similarly to anthracnose and deteriorate rapidly. Petioles and peduncles are also attacked. More than a score of host plants, both annual and perennial have been listed. The presence of the characteristic sclerotia on diseased plants is the primary diagnostic symptom. The sclerotia may remain viable for at least a year and constitute the primary type of inoculum in the dissemination of the disease. The fungus in culture shows optimum growth at pH 6 with some growth at pH 3 and pH 9. The cardinal temps. are 15°, 29° and 33° C. It is extremely pathogenic on many vegetable plants under optimum conditions. The basidiospore stage has been described and given the binomial C. microsclerotia.—G. F. Weber.

15813. WIANT, JAMES S., S. S. IVANOFF, and JOHN A. STEVENSON. White rust of spinach. Phytopath. 29(7):

15813. WIANT, JAMES S., S. S. IVANOFF, and JOHN A. STEVENSON. White rust of spinach. Phytopath. 29(7): 616-623. 2 fig. 1939.—White rust of spinach, caused by an Albugo was first noted in March, 1937, on the New York market in shipments from the Winter Haven section of Texas. The disease was destructive throughout this region during 1937 and 1938. Although A. candida, A. bliti, and A. eurotiae have been reported on various members of the Chenopodiaceae, these species differ from the spinach fungus, which is assigned to A. occidentalis Wilson.—J. A. Stevenson.

DISEASES CAUSED BY BACTERIA

15814. GEIGER, WALTON B. Jr., and R. J. ANDERSON. The chemistry of Phytomonas tumefaciens. I. The lipids of Phytomonas tumefaciens. The composition of the phosphatide. Jour. Biol. Chem. 129(2): 519-529. 1939.— Bacteria grown on a glycerol-containing medium contained about 2% of total lipids, bacteria grown on a sucrose-containing medium, about 6%. The lipids contain about 44-64% phosphatide, and the remainder is acetone-soluble fat. The phosphatide is a mixture of about equal parts of lecithin and cephalin. Besides normal saturated and unsaturated acids belonging to the C16 and C18 series, the phosphatide contains liquid-saturated acids of high mol. wt. —W. B. Geiger, Jr.

15815. SMITH, T. E. Host range studies with Bacterium solanacearum. Jour. Elisha Mitchell Sci. Soc. 54(2): 189-190, 1938.

DISEASES CAUSED BY PHANEROGAMS

15816. JACKSON, L. W. R., and F. KAPLAN. Dodder damages black locust seedlings at a Pennsylvania nursery. Jour. Forestry 36(7): 712. 1938.—Notes on an outreak of Cuscuta arvensis infestation on Robinia pseudoacacia seedlings, apparently brought in with clover seed.—F. V. Rand (courtesy of Exp. Sta. Rec.).

15817. SCHUMACHER, WALTER, und WILHELM HALBSGUTH. Über den Anschluss einiger höherer Parasiten an die Siebröhren der Wirtspflanzen. Ein Beitrag zum Plasmodesmenproblem. Jahrb. wiss. Bot. 87(2/3): 324-355. 1938.—In the Orobanche spp. examined, (O. ramosa, speciosa, minor, hederae, lucorum and rapum genistae) at the union of parasite and host, the cells of the parasite compress the sieve tubes of the host laterally and usually flatten them into wedges. The stream of material in the sieve tube is then not noticeably interrupted by callus but apparently continues uninterruptedly in to the plasma-filled parasite cells. Contrary to the mode of union of parasite and host in connection with water-movement, sieve tube-like elements are never developed by the parasite at the point of union. In O. speciosa corresponding pits and plasmodesma occur between parenchyma cells of parasite and host so that plasmatic connection between host and parasite is possible; but such linkages have not been recognized in the phloem and are probably not present. In Cuscuta odorata the mycelium-like long terminal cells which radiate out from the haustorium through the host parenchyma have numerous plasma threads in their walls, which penetrate the cell wall to be free on the surface of the parasite cells; but these "plasmodesma" are missing exactly where these cells press against a sieve tube and develop their absorptive foot. The main exchange of material from sieve tube to parasite must evidently take place through the 2 cell walls without intervention of plasmodesma. It is suggested that the plasma threads in the walls of Cuscuta cells act rather as perceptive organs than as channels of movement. This conclusion may be generalized; the authors have noticed similar plasmodesma in the outer wall of the epidermis of various objects, particularly in different tendrils. J. H. Priestley.

DISEASES CAUSED BY ANIMAL PARASITES

15818. DEWEZ, W. J. Aaltjesziekte in mais. [Nematode disease in corn.] *Tijdschr. Plantenziekten* 45(1): 23-24. 1939.—Corn grown in fields where nematodes had previously occurred regularly on rye and on oats, showed many dwarfed plants with swollen bases in which nematodes were found.—*H. L. G. de Bruyn*:

15819. DICKEY, R. D., and HAROLD MOWRY. The effect of root-knot upon the subsequent growth of tung-oil (Aleurites fordi) seedlings. Proc. Amer. Soc. Hort. Sci. 36: 389-392. 2 fig. 1938(1939).—19 tung seedlings severely affected with root-knot (Heterodera mariom) were planted in the field in Feb., 1932. The root systems of the trees remaining alive were examined in Feb., 1936. On 18 of the trees, all trace of the root-knot injury had disappeared. The infected tree was replanted and when taken up in Dec., 1938, it was found that all signs of the root-knot injury had disappeared. Tung seedlings are quite susceptible to attack by the root-knot nematode their 1st growing yr in the nursery whereas these same seedlings, when planted in the field at 1 yr. of age or older, are apparently quite resistant, if not immune. Severely affected seedlings, when planted in the field, show no further infestation and eventually grow out of any evidence of the previous infestation, as far as the root system is concerned.—Authors.

15820. HASTINGS, R. J. The biology of the meadow nematode Pratylenchus pratensis (De Man) Filipjev 1936. Canadian Jour. Res. Sect. D 17(2): 39-44. 1939.—This nematode completes its life cycle in 54 to 65 days—25 to 31 days from the larval stage to the adult, and 29 to 34 days from maturation to the 2d generation. Eggs are deposited by a single \$\mathbb{2}\$ at the rate of not more than one a day. The largest number of eggs laid by a \$\mathbb{2}\$ in one place was 16, owing apparently to migratory habits. The total number of eggs from a single \$\mathbb{2}\$ could not be detd. The adult \$\delta\$ and \$\mathbb{2}\$ and all larval stages can enter the roots of oats. They are very susceptible to desiccation. No living nematodes were recovered from invaded root tissue that was allowed to dry. In moist excised oat roots, the nematodes remained viable for more than 30 days, but in water the majority died within the same period. A 10-min. immersion of infested oat roots in hot water destroys \$P\$. pratensis only when the temp. is 120° F, or higher.—Auth. abst.

VIRUS DISEASES

15821. CRÉPIN, C., J. BUSTARRET, et R. CHEVALIER. Cultures de plants de pommes de terre en montagne. Ann. Épiphyties et Phytogénetique 4(3): 449-480. 6 fig. 1938—Rates of development of "degeneration diseases" in potato vars. grown at low or high altitudes are compared. The growth of potatoes for "seed" at high altitudes is considered to be the best means of checking virus infection.—W. V. L.

to be the best means of checking virus infection.—W. V. L. 15822. FRAMPTON, VERNON L. Viscosimetric studies on the tobacco mosaic virus protein. I. Jour. Biol. Chem. 129(1): 233-244. 1939.—An adaption of the Ostwald viscometer was used in the viscosimetric studies on the virus protein. The viscosity of water and of a 4.3% soln. of serum albumin is independent of the rate of shear; the apparent viscosity of the sols of the virus protein in water increases without limit as the shearing stresses are decreased. If the Kuhn equation is applied using the viscosity data, the apparent ratio of length to thickness of the protein particles increases without limit as the shearing stresses are decreased. This anomaly shown in the viscosity of the aquisols of the virus protein is decreased on the addition of either urea or glycine. The effect of these 2 solutes is immediate, and occurs before the biological activity of the virus protein is reduced. The anomaly of the aquisols of the virus protein is increased as the pH of the isoelectric point is approached from the alkaline side. A sphere, dropped through a quiescent sol that shows slight birefrin-

gence, leaves a trail in its wake that is visible through crossed polaroid plates. The trail persists indefinitely, thus indicating that Brownian movement in the sol is curtailed. and that the quiescent system is solid.-V. L. Frampton.

15823. FRAMPTON, VERNON L. On the molecular weight of the tobacco-mosaic virus protein. Phytopath. 29(6): 495-497. 1939.—A discussion. The limitation of the applicability of the laws of Fick, Stokes, and Pouiselle to sols of the virus protein in water and phosphate buffer in the determination of the particle weight, is pointed out.-V. L. Frampton

15824. KAUSCHE, G. A. Über die Bildung von hexagonalen Viruskristallen aus Suspensionen des Tabakmosaikvirus in vitro. Naturwissensch. 27(5): 77-78. Illus. 1939.

15825. KUNKEL, L. O. Movement of tobacco-mosaic virus in tomato plants. Phytopath. 29(8): 684-700. 2 fig. 1939.—Under the conditions of the expts. reported: (1) Tobacco-mosaic virus never began movement out of inoculated leaflets of tomato plants in 42 hrs. or less. It occasionally moved throughout the stem of a plant in 44 hrs., but the interval required varied greatly with different individuals. (2) On first reaching the stem from an inoculated leaflet, the virus usually moved both upward and downward. It sometimes moved downward only, and occasionally upward only. No evidence was obtained in support of the hypothesis that passage of virus from an inoculated leaf to the tip of a plant is via the roots. Proof was obtained that it did not follow such a course in certain plants. (3) When movement from an inoculated leaflet begins, the virus travels rapidly, sometimes at a rate of 7 inches per hr. or faster. (4) Samuel's observation that in the earliest stages of entering the stem virus particles may be separated by considerable distances is fully confirmed. The particles must pass through long chains of cells without infecting. This movement cannot, therefore, result from propagation by means of an autocatalytic reaction. (5) Virus particles that have remained for some time in a dormant condition in sections of tomato or tobacco stems may move out into plants grown from such sections and there multiply and cause disease.—L. O. Kunkel.

15826. LAUFFLER, MAX A., and WM. M. STANLEY. The physical chemistry of tobacco mosaic virus protein. Chem. Rev. 24(2): 303-321. 1939.—The shape and size of the tobacco mosaic virus are interpreted through optical, ultracentrifugation, viscosity, diffusion, filtration, x-ray and absorption studies. Electrophoretic studies, behavior at various H-ion cones, and absorption spectra are observed.—

C. E. Georgi.

15827. McWHORTER, F. P., and J. A. MILBRATH. The tipblight disease of tomato. Oregon Agric. Exp. Sta. Circ. 128. 1-14. 4 fig. 1938.—The name "tipblight" is given to a virus disease typically developed in the tomato-canning counties of southern Oregon where yields have frequently been very seriously reduced. The results of the 4-yr, study here summarized include a description of the disease, its nistory and distribution, infectiousness, means of spread, and certain facts about the causal virus considered necessary or discussing control methods. Tipblight may be found in Rogue River Valley fields late in June, but it does not become abundant until July and Aug. The amt. present nd its dissemination are said to be directly influenced by he abundance of its insect carriers (shown to be species f thrips) and the availability of the weed hosts of the arriers. The virus is said to be difficult to transmit by rtificial inoculation, is unable to resist aging, high temps., dilution in water, and is apparently not seed-borne. dilution in water, and is appeared. The possibility of weeds serving as virus reservoirs was xperimentally demonstrated, though actual overwintering nder field conditions has not yet been proved. Various idirect methods of control are outlined, and some progress reported in the isolation and development of resistant rains of tomato.—Courtesy Exp. Sta. Rec.

15828. OCFEMIA, GERARDO OFFIMARIA, and LARTIN S. CELINO. The behavior of POJ 2878 sugar me in relation to Fiji disease and transmission of the virus y nymphs of Perkinsiella vastatrix. Phytopath. 29(6): 12-517, 1 fig. 1939.—Among apparently healthy stalks of OJ 2878 sugar cane selected from a field, 2 stalks produced roots some of which were infected with Fiji disease and the others were disease-free. The shoots that did not show

symptoms of the disease were virus-free. When the apparently healthy shoots that came from the 2 stalks were used in transmission expts. they became readily affected with Fiji disease. In addition to the adults of P. vastatrix, 2d. 3d, 4th, and 5th instar nymphs can transmit the virus of Fiji disease. The nymphs that hatch from eggs of viruliferous leaf hoppers do not carry the virus of Fiji disease. Viruliferous adults require at least 24 hrs. to elapse before they can transmit the disease.—G. O. Ocfemia.

15829. ROLAND, G. Etude des maladies a virus de la betterave et de l'epinard, effectuee en 1938. Publ. Inst. Belge Amélior. Betterave 7(2): 67-95. 1939.—In beet, yellows symptoms are more pronounced at 17°C than at 30°C. N tends to mask the symptoms. Atmospheric humidity shows no marked influence on yellows symptoms in the greenhouse. The aphis, Aulacorthum solani, transmits the yellows virus. The following plants are hosts for yellows virus: Spinacia oleracea, Chenopodium album, Beta cicla viridis, Amaranthus retroflexus, Atriplex hortensis, and Atriplex sibirica. Half an hour is sufficient for Myzus persicae to stay on a healthy beet in order to infect it with yellows. A non-infected M, persicae becomes a vector of the virus after 1 hr. on a diseased beet. Photosynthetic activity of healthy plants exceeds that of diseased ones. The greater starch content of diseased leaves is due to accumulation rather than to greater photosynthetic activity. Organic manures (probably N) give some control against the effects of yellows.—W. W. Robbins.

15830. STANLEY, W. M. The isolation and properties of tobacco ring spot virus. Jour. Biol. Chem. 129(2): 405-428. 1 fig. 1939.—A high molecular weight nucleoprotein possessing the properties of tobacco ring-spot virus was isolated from diseased tobacco plants by differential centrifugation. The virus is denatured and inactivated on heating to 64° C, on treatment with nitrous acid or with 36% urea in 0.01 M phosphate at pH 7, on standing at room temp. in aqueous soln., or when subjected to H-ion concs. more alkaline than pH 9 or more acid than about pH 6. It is denatured and inactivated when frozen in solns, containing no extraneous materials, but is protected to varying degrees when frozen in the presence of electrolytes, plant pigments, or nutrient broth. One precipitation of ring-spot virus with 30% (NH₄)₂SO₄ at 4° C causes a large amount of inactivation. Although solns of the virus in 0.01 M phosphate buffer are fairly stable, there is a marked increase in viscosity and a fairly rapid loss of activity in aqueous soln. Solutions of ring-spot virus containing 0.01 M phosphate buffer give many more lesions on inoculation than do solns, containing more concentrated or more dilute phosphate buffer or other electrolytes. The optimum conditions for storing and for testing tobacco ring-spot virus, namely, in 0.01 M phosphate buffer at pH 7 and 4° C, and in 0.01 M phosphate buffer, respectively, are quite different from those for tobacco mosaic virus. These results demonstrate the importance of making a careful study of the optimum conditions for storing and testing each virus under investigation. Tobacco ring-spot virus has a sedimentation constant of 115×10^{-13} , an isoelectric point of pH 4.7, a specific gravity of 1.57, yields isotropic pellets on ultracentrifugation, and exhibits no double refraction of flow. The mol. wt. and diam. based on some of these constants and on ultrafiltration data are 3,400,000 and 19 m μ , respectively. Tobacco ring-spot virus is the smallest of the viruses which have been isolated and appears to be essentially spherical. It is quite unstable in comparison with tobacco mosaic virus and has not been obtained in crystalline form, although no alteration in the properties as a result of purification has been noted. Tobacco ring-spot virus contains about 40% of nucleic acid, which gives negative tests for desoxy sugar and a positive test for pentose. The nucleic acid content is about 8 times that of tobacco mosaic virus and approaches that of the sperm nucleoproteins. The virus gives a specific precipitin reaction with its antiserum.—W. M. Stanley.

15831. STANLEY, W. M. Isolation of virus from plants

recovered from the tobacco ring spot disease. Jour. Biol. Chem. 129(2): 429-436. 6 fig. 1939.—Normal appearing recovered leaves of Turkish tobacco plants diseased with tobacco ring-spot virus contain about 1 part of virus in 500,000 parts of fresh green leaf material; leaves bearing

many necrotic lesions, and from the same plants, were found to contain 1 part of virus in 80,000 parts of fresh green leaf material. No difference in the activity, sedimentation constant, isoelectric point, or general properties of virus from the 2 sources was found; hence, the virus in recovered plants appears to be the same as that in systemically diseased leaves bearing necrotic lesions. Recovery results from an adjustment on the part of the host and appears to consist of some mechanism by means of which the level of conc. reached by the virus is gradually lowered to about to of the former level, with the disappearance of readily visible symptoms of the disease. Immunity apparently results from the continued persistence of a low conc. of unaltered virus in plants recovered from the ring-spot disease.—W. M. Stanley.

15832. TATE, H. D., and S. R. VANDENBERG. Trans-

mission of sugarcane mosaic by aphids. Jour. Agric. Res. 59(1): 73-79. 1939.—Four species of aphids, Carolinaia cyperi, Hysteroneura setariae, Sipha flava, and Aphis maidis. were used in expts. on sugarcane mosaic transmission in Puerto Rico. Out of 192 plants exposed to C. cyperi taken from diseased plants, 60 developed mosaic; and of 200 healthy plants exposed to infective A. maidis, 69 became diseased. Successful transmission was obtained with H. setariae, although it was a less efficient vector than either A. maidis or C. cyperi. No positive transfers were obtained with S. flava. In most cases a higher percentage of transmission resulted when young seedling plants were exposed to infective aphids than when plants grown from cuttings were used.—H. D. Tate.

15833. VALLEAU, W. D. Symptoms of yellow ring spot and longevity of the virus in tobacco seed. Phytopath. 29(6): 549-551. 1939.—The tobacco-ringspot virus may be transmitted through seed from generation to generation without the production of ring patterns; the chief symptoms of the disease are general chlorosis (yellow strain) leaf edge

symptoms and pollen sterility. Ring- and line-patterns are inoculative and invasive symptoms. The virus survives in seeds for more than 5½ yrs.—W. D. Valleau.

15834. VINSON, C. G., D. K. McREYNOLDS, and N. S. GINGRICH. Virus protein of mosaic disease of tobacco. Missouri Agric. Exp. Sta. Res. Bull. 297. 1-12. 3 fig. 1939.— The virus readily separated in the crystallinelike form of Stanley when anhydrous solid Na₂SO₄ was added to the virus fraction after adjustment to pH 4. Most of the ash could be removed from this crystallinelike material by washing with dilute acetic acid. The N content was around 16%, and P was present. All visible traces of the brown pigment normal to tobacco-plant juice could be removed from the purified fraction by shaking a phosphate dispersion with ether, the pigment being carried to the top as the droplets of ether rose. X-ray diffraction patterns (camera and procedure described) of this virus protein prepared by the Na₂SO₄ method were obtained, but they failed to agree very well with those obtained by Wyckoff and Corey who used virus protein prepared by the (NH₄)₂SO₄ method of Stanley. There was no indication on any film of spacings greater than 14.3A, although spacings as great as 50A could have been detected. Wyckoff and Corey recorded 6 spacings greater than 14.3A. Spacings as low as 2.43A were obtained, in contrast to the smallest spacing of 3.39A recorded by Wyckoff and Corey. The absence of long spacings in virus protein prepared by the Na₂SO₄ method may indicate it to be composed of smaller molecules, and hence with a lower molecular weight than that studied by others.-Courtesy Exp. Sta. Rec.

NON-PARASITIC DISEASES

15835. BLODGETT, EARLE C., and WILLIAM E. COLWELL. Relation of drought spot of prunes to boron content of fruit. Phytopath. 29(7): 650-651. 1939.—Drought injury of prunes, particularly the drought-spot type, is common and frequently serious in Idaho. Preliminary analyses of drought spot and healthy fruit have shown a definite relation between the disease and low B content of fruit tissue and pits.—E. C. Blodgett.

15836. ECKSTEIN, OSKAR, ALBERT BRUNO, und J. W. TURRENTINE. Kennzeichen des Kalimangels. Signes

de manque de potasse. 2nd ed. xii +235p. 54 pl., 41 fig. Verlagsgesellschaft für Ackerbau: Berlin, 1937. Pr. \$2.25.—

This second edition is a reprinting, with a few unimportant changes in the original text.—O. W. Willcox.

15837. HACKNEY, J. CARLYLE. The rôle of magnesium

in a chlorosis of peach. Jour. Elisha Mitchell Sci. Soc. 54 (2): 191-192, 1938

15838. JOHNSON, JAMES. Studies on the nature of brown root rot of tobacco and other plants. Jour. Agric. Res. 58(11): 843-863. 2 pl., 5 fig. 1939.—Tobacco and a wide variety of other plants are listed as susceptible to brown root rot. The true nature of the disease is not known, though it most frequently occurs on tobacco following certain preceding grass or legume crops. The expts. were conducted in the greenhouse largely on soils secured from Massachusetts. The causal agent is destroyed by temps, as low as 45°C, by freezing temps., by desiccation and by certain chemical substances some of which possess relatively low germicidal value at the concs. used. 2% of powdered charcoal mixed with the soil also eliminated the disease. Histological and cytological examination of diseased tissues failed to reveal any organism associated with the disease. The diseased cells are usually sharply delimited from normal cells. Affected cell walls are yellow and thickened and the cell contents discolored and granular. The lesions may be superficial or they may extend to and follow the stele. No new theory as to cause of brown root rot is offered.— J. Johnson.

15839. PERRY, JOHN C. Some observations on psorosis in the light of experience of 25 years. California Citrograph 24(8): 276, 290-293. 1939.—Summaries are presented of the results of control operations for psorosis in 12 old orange orchards over a long period. Many hints are given to help in the practical orchard care of diseased trees.—C. S. Pomeroy.

15840. SPENCER, ERNEST L., and GEORGE I. LAVIN. Frenching of tobacco. *Phytopath.* 29(6): 502-503. 1939.—Spectrographic analyses failed to show the presence of thallium in tobacco plants affected by frenching. However, the numerous similarities between frenched plants and those injured by Tl are very striking. The failure to detect Tl may be due to localization of Tl in the roots or to some other technical difficulties.—E. L. Spencer.

PARASITISM AND RESISTANCE

15841. AKAI, SHIGEYASU. Studies on the pathological anatomy of the hypertrophied buds of Camellia japonica caused by Exobasidium camelliae. [In Jap. with Eng. summ.] Bot. Mag. [Tokyo] 53(627): 118-125, 1 pl., 6 fig. 1939.—The organism grows in the intercellular spaces of the cortex forming a hymenium under 2-25 layers of cells which eventually break open. Hypertrophy and hyperplasia occur. Cortical cells below the hymenium elongate radially due to osmomorphosis. New vascular bundles are formed in the cortex from a new cambium developed near the phloem. These are usually collateral or bicollateral, some-times leptocentric or hadrocentric, and extend obliquely toward the hymenium. They seem to supply nourishment for the fungus.—E. H. Walker.

15842. ASUYAMA, H. The time length needed in accomplishing infection of the leaf rust fungus, Puccinia

triticina, on wheat seedlings. [In Jap. with Eng. summ.]

Ann. Phytopath. Soc. Japan 8(4): 298-308. 1939.—At 23°C the urediospores germinated within 1 hr., and appressorium formation was observed in a few cases 3 hrs., and in $\frac{1}{2}$ - $\frac{1}{2}$ of the cases 7-9 hrs., after inoculation. Stomatal invasion was observed occasionally within 4 hrs. and frequently 6-9 hrs. after inoculation; after 24 hrs. a majority of appressoria produced invasion tubes. Production of infection hyphae was first observed 9 hrs. after inoculation and the haustoria developed after about 20 hrs. At 8° C infection was slow; 24 hrs. after inoculation the substomatal vesicles were just producing infecting hyphae. At 13°C, stomatal invasion was observed 9 hrs. after inoculation; at 15°-25°C, 3-6 hrs. after inoculation; at 18°C, haustorium-formation occurred. When the inoculation was made with urediospores kept in a refrigerator for 14 days, germination and subsequent development of the hyphae, including stomatal infection, were greatly delayed. The minimal periods needed for the completion of infection were 9 hrs. at 8°-13°C, 6 hrs. at 15°-20°C, and 3 hrs. at 23°C. Infection prevailed when the seedlings were kept in a moisture-saturated atmosphere

for 14 hrs. at 8°-13°C, and for 6 hrs. above 15°C. The optimum temp, for infection was 18°-25°C. When the inoculated plants were removed from the moist chamber to a dry atmosphere before the appressorium formation infection did not occur, but after the fungus had passed through the stomata, the progress of the infection was not prevented by dryness. The passing of the hyphae through stomata is evidently a critical point in the infection of *Puccinia triticina* on wheat.—Y. Tochinai.

15843. BARRONS, K. C. Breeding horticultural crops for resistance to the root-knot nematode. *Proc. Assoc. Southern [U.S.A.] Agric. Workers* 39: 106, 107. 1938.—An

15844. BARTHELET, J. La nutrition des végétaux et le parasitisme. Ann. Agron. [Paris] 9(2): 253-268. 1939.—When fertilizer action is shown to be important in parasite control it is difficult to explain why. Apparently maximum resistance is normally obtained when equilibrium exists in the nutrients available to the plant. There is such vast complexity in the plant's environmental factors that an experimenter in this field must determine all known facts

before drawing conclusions.—R. R. McKibbin.

15845. CREPIN, C., J. BUSTARRET, et R. CHEVALIER. La résistance des variétés d'avoine au charbon nu. Ann. Épiphyties et Phytogénetique 4(3): 391-412. 1938.—Loose smut (Ustilago avenue) is the commonest oat disease in France. Most resistant vars, tested appeared to possess

France. Most resistant vars. tested appeared to possess several genetic factors for resistance, which were independent of other characters. Numerous physiologic forms of U. avenae were found. The prospects for breeding resistant vars. appear good.—W. V. L.

15846. CRÉPIN, C., J. BUSTARRET, et R. CHEVALIER. Nouvelles recherches sur la résistance des blés aux caries. Ann. Épiphyties et Phytogénetique 4(3): 413-447. 4 fig. 1938.—The germination of resistant wheat vars. contaminated with bunt spores was significantly reduced by 7% to 22% in some cases, but in others there was no effect. There was no reduction in yield. French collections of bunt were less virulent than those from other countries. Resistant vars. varied considerably in their reactions to different colvars. varied considerably in their reactions to different collections of bunt. Physiologic forms of bunt were isolated from separate bunted ears. There are from 2 to several genetic factors concerned in resistance; these are independent of other morphological or physiological characters.—

15847. FISCHER, GEORGE W. Studies on the suscepti-15847. FISCHER, GEORGE W. Studies on the susceptibility of forage grasses to cereal smut fungi. III. Further data concerning Tilletia levis and T. tritici. Phytopath. 29(7): 575-591. 2 fig. 1939.—Inoculations of grasses in the tribe Hordeae with T. levis and T. tritici proved Agropyron inerme, A. spicatum, A. trichophorum, and Sitanion jubatum to be susceptible to these wheat smut fungi. 20 selections of crested wheatgrass (A. cristatum) and 16 of slender theatgrass (A. cristatum) with each of wheatgrass (A. pauciflorum) were inoculated with each of 8 races of T. levis and 11 of T. tritici. Some races (L-3 and L-6) of T. levis and T-2 and T-8 of (T. tritici) were and 1-0 of 1. tevts and 1-2 and 1-8 of (1. tritici) were several times as virulent on crested wheatgrass as the other races. On slender wheatgrass race T-10 of T. tritici was especially virulent. As a species, T. levis is more virulent on crested wheatgrass than is T. tritici, but on slender wheatgrass, T. tritici is the more virulent. Much greater differences were discovered in the reactions of the 36 selections of crested and slender wheatgrass to the smut races than in the relative virulence of the latter. Although none of the crested wheatgrass selections proved to be absolutely maune from T. levis, a few were highly resistant. One selection appeared immune from T. tritici. 8 of the 16 elections of slender wheatgrass appeared to be immune rom all of the 8 races of T. levis, only 2 were moderately susceptible, and the remainder were more or less resistant. The same selections that were resistant to T. Levis were, n general, also resistant to T. tritici. One selection exhibited nore or less susceptibility to each of the 11 races of T. note of less susceptibility to each of the 11 laces of 1. ritici. As a species, $Agropyton\ cristatum$ is more susceptible bunt of wheat than is $A.\ pauciforum$. The mycelium if $T.\ levis$ and $T.\ tritici$ is perennial in perennial hosts. 19 90 spaced plants of Agropyron cristatum, A. pauciflorum, 1. subsecundum, and Hordeum nodosum showing smut in 935, 39 were in some manner freed of infection during the years following, 7 died, and 44 still retained the disease

in 1937. In general, it is thought that the duration of perennation of the mycelium of T. levis and T. tritici in their perennial hosts will be influenced by, (1) the degree of susceptibility of the host plant, (2) predisposition of the infected plants to drought or winter injury. Smut balls of *T. tritici* found in a sample of sweet-clover seed, but obviously from some grass, proved to be race T-8 of this smut species, on the basis of inoculations of winter- and spring-wheat differentials. It has been observed that the bunted grass plants resulting from infection with T. tritici tend to be more or less stunted.—G. W. Fischer.

15848. FORBES, IRVIN L. Factors affecting the development of Puccinia coronata in Louisiana. Phytopath. 29(8): 659-684. 1939.—Urediospores of P. coronata kept at 29(8): 659-684. 1939.—Urediospores of *P. coronata* kept at —18° or at 33° C rapidly lost their germinability. Spores stored at 10° C germinated after 413 days, 8% germination having been obtained. At 4°, 15°, and 20° C urediospores lost their viability rather rapidly. Urediospores exposed to summer field conditions at Baton Rouge did not germinate summer field conditions at Baton Rouge did not germinate and the state of the state after 75 days. No oats plants or susceptible wild grasses occur at Baton Rouge during the 3-month period of July 1 to Oct. 1, and fall-planted oats do not rust before late Dec.; crown rust inoculum is evidently blown in from other regions. The minimum, optimum, and maximum temps, for germination of *P. coronata* urediospores are 0°-2°, 15°-20°, and slightly below 35° C, respectively. Rust developed on plants incubated at 0°-2°, and post-incubated at 20°, but not on plants incubated at 10° or 20° and post-incubated at 0°-2°. The blue rays and to a lesser extent the violet at 0°-2°. The blue rays and to a lesser extent the violet are responsible for the negatively phototropic response of the urediospore germ tubes to white light in the 4 rusts studied, P. coronata, P. graminis avenae, P. graminis tritici, and P. triticina. Urediospore germ tubes of P. coronata seem to enter the host plant with no difficulty, whether the plants are in light or darkness. The minimum pH at which germination of urediospores of crown rust occurred was about 2.7; the optimum, 6.7; and the maximum, 9.2. The resistance of oat vars. to crown rust was studied under field conditions at St. Paul, Minn., and at Baton Rouge. The most highly resistant var. during the 3 years' tests was Victoria. The var. Bond was immune in the field at Baton Rouge in 1933 and 1934. Extracts from the Victoria and Rouge in 1933 and 1934. Extracts from the Victoria and Bond vars. markedly reduced the percentage of germination of urediospores over that in the checks and in extracts from the susceptible var. Victory, and also caused much distortion of germ tubes and delayed the rate of growth of germ tubes.—I. L. Forbes.

15849. GREATHOUSE, GLENN A. Alkaloids from Sanguinaria canadensis and their influence on growth of Phymatotrichum omnivorum. Plant Physiol. 14(2): 377-380. 1939.—Three alkaloids were isolated from roots and rhizomes of S. canadensis by the method of Fischer. Sanguinarine prevented the growth of P. omnivorum at a conc. of 2.5 p.p.m.; chelerythrine permitted a fungous growth of 3.4 mg. at a conc. of 10 p.p.m.; protopine at a conc. of 100 p.p.m. yielded a fungous growth of 81 mg., in contrast to 369 mg. for the controls. These alkaloids may be important factors in the resistence of this plant to be important factors in the resistance of this plant to

Phymatotrichum root rot.—G. A. Greathouse.

15850. INOUE, Y. Comparison of the cellulose-decomposition by culture strains of the rice blast fungus, Piricularia Oryzae Br. et Cav. [In Jap. with Eng. summ.] Ann. Phytopath. Soc. Japan 9(1): 33-40. 1939.—The cellulose-decomposing capacities of 21 strains of the fungus were studied in relation to their pathogenicity to rice plants. The fungus was cultured on a synthetic agar medium containing colloidal cellulose. After 2 wks. at 28°C the cellulose-decomposing capacities of the strains were compared by the width of clear and semitransparent zones appearing around the colonies using an iodine soln. Differences in cellulose decomposition by the different strains were observed, and appeared to be correlated with the pathogenicity of the strain to rice, the more virulent strains being most active in decomposing cellulose.-Y. Tochinai.

15851. KIMMEY, J. W. Susceptibility of Ribes to Cronartium ribicola in the West. Jour. Forest. 36(3): 312-320. 1938.—Tests of 51 spp. and forms of Ribes show R. nigrum to be most susceptible to Cronartium ribicola infection and of greatest telium-producing capacity. The open form of R. cereum is least susceptible and produces least

telia. Comparative susceptibility and telia production of other spp. and forms are tabulated. Generally, the more susceptible spp. produce the more telia.—A. G. Hall.

15852. KREUTZER, W. A. Host-parasite relationships in pink root of Allium cepa L. I. The pigment of Phoma terrestris. Phytopath. 29(7): 629-632. 1939.—Roots invaded by the causal agent, P. terrestris, are occasionally colored yellow to yellow-brown. Temp. and nutrient variation had little to do with this phenomenon. Decreasing the pH produced a color change, the hue induced being comparable to that observed in nature. Preliminary trials, using diseased pink roots and agar mats on which the fungus was growing, showed a color shift from the red to red-purple shades at pH 8.5 to a yellow to yellow-brown at pH 4.5. By extracting the pigment from the hyphae, using 0.1 N HCl followed by 0.1 N NaOH, the coloring material was obtained in a soluble state. Using the pigment in solution, a more sensitive test was obtained, the color shift being observed to take place within the range of pH 7 to 7.86. The pigment was obtained from its alkaline soln. by the addition of saturated Na₂SO₄ and was returned to its soluble state only by treatment with 0.1 N HCl followed by 0.1 N NaOH. Since the material apparently is hydrolyzed by emulsin it appears that at least part of the molecule partakes of the nature of a β-glucoside.—W. A. Kreutzer.

15853. KRIJTHE, N. Verslag over de werkzaamheden voor het iepenziekte-comité, verricht aan het laboratorium voor erfelijkheidsleer in 1938. [Investigations for the elm disease committee conducted at the laboratory for genetics at Wageningen in 1938.] Tijdschr. Plantenziekten 45(2): 63-70. 1939.—The weather conditions during 1938 were such as to prevent seed setting of elms in the open, but the set of seed in bags was good. Some of the pollen was gathered from branches kept indoors, but it was not always possible to eliminate dehisced anthers, therefore, some of the seedlings may have resulted from self-pollination. About 40% of the seed germinated, but subsequent mortality from fungi or insects reduced this number. Leaf arrangement in the seedlings could not be used as an index of hybrid nature. The chromosome number of many trees was detnd.—H. L. G. de Bruym.

15854. KUMMER, HANS. Untersuchungen über die biologische Spezialisierung des Schwarzrostes in Württemberg. Zeitschr. Pflanzenkr. 49(2): 65-76, 1939.—In 1935-37 strong south and southeast winds during July and Aug. blew stem rust (Puccinia graminis) inoculum into areas of Württemberg, Germany, from which many barberries had been removed. Rust was severe on wheat and spelt in certain local areas. Physiologic races were identified in 13 stem-rust collections made in Württemberg in Aug., 1937: 5 collections from spelt, 4 from wheat, 2 from rye, and 1 each from oats, barley, and quack grass. Race 14 of *P. graminis tritici*, which was slightly weaker than the race 14 described by Stakman and co-workers, was found in 3 collections from spelt and 3 from wheat. Steiner's red Tyrolean spelt and Waggerhauser's Hohenheimer white Kolben spelt were severely rusted. The very virulent race 40, common in Europe during the stem rust epidemic of 1932, occurred in 2 collections from wheat. Stakman, in work on these collections, also identified race 56 from one of the collections on wheat, the first report of this race in European collections. The collection from barley contained race 143; and from 2 of the spelt collections a new race of *P. graminis tritici* was obtained but has not yet been assigned a number. The new race is virulent on Little Club, Marquis, Arnautka, Mindum, Spelmar, Kubanka, Acme, Vernal, and Hope wheats; it causes the mesothetic "X" reaction in Kota; and it is work on Vernal Figure Whenly and Thatche and it is weak on Kanred, Einkorn, Khapli, and Thatcher varieties. The single collection from oats is race 6 of *P. graminis* avenae and the 2 oat vars. common to Württemberg are very susceptible. P. graminis secalis was harbored on quack grass.—H. Hart.

15855. LeCLERG, E. L. Methods of determination of physiologic races of Rhizoctonia solani on the basis of parasitism on several crop plants. *Phytopath*. 29(7): 609-616. 1 fig. 1939.—A comparison was made of damping-off of sedlings and direct inoculation of underground stems of older plants as a basis for determination of physiologic races of *Rhizoctonia solani*. The results for individual isolates from the damping-off data in successive tests were more

variable than were those from direct inoculations. The latter method appears most promising, if a large number of plants are inoculated with each isolate to be tested and if environmental conditions can be accurately controlled.—
E. L. LeClerg.

15856. McFADDEN, E. S. Early Blackhull resists stem rust in Texas. Phytopath. 29(7): 644-645. 1939.—Early Blackhull winter wheat has proved to be moderately resistant to stem rust (Puccinia graminis tritici) in the field at several expt. stations in Texas in the known presence of 10 physiologic races of the fungus. The variety has remained relatively free from the disease for about 2 weeks after certain other vars. have become heavily infected. Shortly before ripening, and too late to do much injury, Early Blackhull may develop considerable rust in the form of small, distinctly isolated pustules. An occasional F₂ segregate from crosses between Early Blackhull and wheats having the Hope type of mature plant resistance is resistant both early and late in its life history.—E. S. McFadden.

and late in its life history.—E. S. McFadden.

15857. NOBÉCOURT, P. Le problème de l'immunité chez les végétaux. Bull. Assoc. Diplômés Microbiol. Fac. Pharm. Nancy 17: 9-28. 1938.—A discussion of natural and acquired immunity among plants. Much work is reviewed, but no references are given.—W. C. Tobie.

immunity among plants. Much work is reviewed, but no references are given.—W. C. Tobie.

15858. PORTE, W. S., S. P. DOOLITTLE, and F. L. WELLMAN. Hybridization of a mosaic-tolerant, wiltresistant Lycopersicon hirsutum with Lycopersicon esculentum. Phytopath. 29(8): 757-759. 1 fig. 1939.—A recent introduction of L. hirsutum from S. America produced a fertile hybrid on L. esculentum vars., Marglobe and Bonny Best. This hybrid is of interest because it appears that L. hirsutum is highly tolerant to tobacco mosaic virus and also resistant to Fusarium wilt (F. bulbigenum var. lycopersic).—W. S. Porte.

15859. REEVES, E. L., M. A. YOTHERS, and C. W. MURRAY. Unusual development of apple perennial canker, following application of toxic wound dressings. Phytopath. 29(8): 739-743. I fig. 1939.—Certain toxic wound dressings, applied to cleaned-out perennial canker lesions on Jonathan apple branches, caused injury to the bark surrounding the cankers, and the fungus, Gleosporium perennans, invaded the bark so injured. Under average field conditions in North Central Washington, the fungus normally invades new bark tissues once a year during a short period at about the time tree growth starts, provided that factors have been favorable for such development. The unusual feature is that the fungus advances and fruits on the injured tissues during the hottest period of the year, at a time when it is difficult to obtain successful artificial inoculations and when, under ordinary circumstances, the fungus is most inactive. The fungus was isolated from bark tissues which contained a total average of 256 p.p.m. of As₂O₃.—E. L. Reeves.

15860. SCHWARTZE, C. D., and GLENN A. HUBER. Further data on breeding mosaic-escaping raspberries. Phytopath. 29(7): 647-648. 1939.—The mosaic-escaping red raspberry var., Lloyd George, carries at least 2 genetic factors for resistance to the mosaic vector Amphorophora rubi; individuals that are somewhat resistant carry fewer resistance factors and susceptible individuals are homozygous recessives.—C. D. Schwartze.

15861. SELARIES, P. Essais sur la carie du blé en Alsace. Ann. Épiphyties et Phytogénetique 4(3): 481-484. 1938.—Strains of Tilletia tritici of different origins showed no increase in virulence after several passages through a susceptible wheat var.—W. V. L.

15862. THATCHER, F. S. Osmotic and permeability relations in the nutrition of fungus parasites. Amer. Jour. Bot. 25(6): 449-458. 10 fig. 1939.—Osmotic pressures of the following subjects were studied by plasmolytic methods: haustoria of Uromyces fabae on Pisum sativum, and U. caryophyllius on Dianthus caryophyllus 21.9 and 18.6 atmospheres, resp.; urediniospore germtubes of U. fabae, 44.25 atm.; healthy tissue of Pisum and Dianthus, 10 and 11 atm., resp.; infected tissue of Pisum 7.7 atm.; the soft-rot fungi Botrytis cinerea and Sclerotinia sclerotiorum (both isolated from Apium graveolens), 29.8 and 23.5 atm., resp.; A. graveolens tissue 8.3-17.4 atm. The rusts induce an increase in the permeability of plasma membranes of susceptible hosts. Values for absolute permeability of water, urea and dextrose are presented. Permeability increase appears to be due to some

secretion of the rust fungus as indicated by the increase in permeability of healthy tissue when immersed in juice from infected tissue. Permeability of celery tissue is increased some distance in advance of cells killed by either soft-rot fungus. An explanation of the transfer of nutrients from host cells to parasites is suggested:-The determining factor in water absorption is suction pressure. This is not identical with osmotic pressure, but in the relationship between parasite and host cell the maximum suction pressure which each of the 2 competitive organisms could exert would be equivalent to its respective osmotic pressure; also, with equal turgor pressure, suction pressure varies directly with osmotic pressure. Hence, with its higher osmotic pressure, the fungus can remove water from neighboring parenchyma cells, and can even maintain a certain degree of turgor in contact with non-turgid host cells or with their free sap. In the absorption of food by the parasite from the host, the passive permeability of the latter seems to be all important. The increased permeability of the host cells extends even to dextrose, so that probably some of the vacuolar solutes, which are normally prevented from escaping, become available to the fungus. In a non-turgid cell those components of the vacuolar solution to which the membrane has become permeable would diffuse out into the free water in the cell walls until the conc. there reached that in the sap. The amt. would be small. In turgid cells, in consequence of the reduction in osmotic pressure, water also would be forced out by wall tension. This mass outward flow of water and vacuolar solutes would also be checked when the reduced wall tension again balanced the effective osmotic pressure, so that cells would not lose turger completely, and

remain alive.—F. S. Thatcher.

15863. THOMAS, H. EARL, and P. A. ARK. Some factors affecting the susceptibility of plants to fire blight. *Hilgardia* 12(4): 299-322. 2 fig. 1939.—Observations on the histology of the shoots of resistant and susceptible plants in general support those of earlier workers indicating that the size of intercellular spaces is a minor factor in determining the course of infection. The tissues known to have a high nitrogen content are in general more susceptible than the nearest comparable tissues of lower nitrogen content. The evidence suggests that the concentration of solutes in the nectar and perhaps also in the plant sap as affected by atmospheric humidity is of importance in the penetration of the organism into the plant and in the subsequent development of infection. On the trunks of girdled pear and apple trees, the bark immediately above the point of girdling is more susceptible than that immediately below. Slight wounds 2 to 4 inches below the points of inoculation of susceptible shoots did not cause any marked change in the development of infection. Tests for gums and suberins failed to detect these substances at the margins of wounds until after the period during which the wounds would be susceptible to invasion. Etiolation had a relatively slight influence on infection, while defoliation definitely reduced susceptibility. In the progeny of a hybrid of Pyracantha angustifolia and P. gibbsii var. yunnanensis, resistance seemed to be at least partially dominant. In the F_2 generation there was no observed relation between susceptibility and re-

semblance to the parents.—Auth. summ.
15864. WALLACE, JAMES M. Recovery from and acquired tolerance of curly top in Nicotiana tabacum. Phytopath. 29(8): 743-749. 4 fig. 1939.—Tobacco plants commonly recover from severe symptoms of curly-top by the gradual production of less severely diseased leaves from the severely diseased terminal, or by the production of axillary shoots. free of symptoms, or nearly so. Plants grown from cuttings from recovered plants show a slight variation in symptom expression from time to time, but in no instance have they relapsed permanently into a stage equalling the typical symptoms produced by inoculation of healthy plants by beet leaf hoppers. Virus is present in recovered plants and was found in plants of the 4th vegetative generation. Cuttings grown from recovered plants showed no effects when reinoculated with curly-top virus. Recovery from one strain of curly-top virus conferred protection against another strain as well as against mixed, unidentified strains of the virus. Recovery of tobacco from curly-top and the acquired tolerance associated with it is similar in many respects to that reported for ring spot of tobacco and curly-top of tomato. Acquired tolerance following recovery of plants from virus diseases may offer the best material yet available for studying the nature of immunological-like phenomena in plants.—J. M. Wallace.

DISEASE CONTROL

15865. BAECHLER, R. H. Experiments on toxicity, leaching, and fire-retarding effectiveness of Wolman salts. U. S. Dept. Agric. Forest Serv. Forest Prod. Lab. 10p. 4 fig. 1938.—The author reports investigations on 2 preservatives-"Tanalith" (NaF, Na chromate, Na arsenate, and dinitrophenol) and "Triolith" (NaF, K₂Cn₂O₇, and dinitrophenol). Both are very toxic to 6 typical wood-destroying fungi and have adequate toxicity for wood-preserving purposes. In the severe leaching tests, the Cr salts proved highly resistant, the total leached throughout the test being only about 1%. About & of the As leached from the Tanalith-treated blocks.. The NaF leached out more rapidly and completely than the other salts, the average proportion leached falling between 70 and 80% of the amt, originally injected. Leaching of NaF from Triolith-treated blocks started at a slower rate than from similar blocks treated with NaF alone, although the total leached at the end of the test was approx. the same. When the leached blocks were exposed to fungus attack in Kolle flasks, it was found that the leaching had been carried so far that they were not immune to attack but, against all but one fungus, they showed much greater resistance than the untreated control blocks. Lenzites trabea. known to be As tolerant, attacked the leached Tanalithtreated blocks about as severely as it did the untreated blocks. Lumber treated with from 0.79 to 0.88 lb. of Wolman salts per cubic foot of wood showed no significant resistance to fire in the Forest Products Laboratory fire-tube test .-Courtesy Exp. Sta. Rec.

15866. [BRATLEY, C. O.], and J. R. WINSTON. Pitting and decay in pineapple oranges. Citrus Indust. 20(1): 6, 7, 17, 20, 21. 4 fig. 1939.—The beneficial effects of low transit temps. on control of decay lasted throughout a marketing period of one week, but the loss, particularly from blue mold (Penicillium) rot, in all lots was excessive. Fruits from each of the 5 cooperating Florida growers were considerably pitted on arrival at New York, and after 7 days were severely pitted. The amt. of pitting was greatly increased by packing house operations and particularly by the "color added" treatment. Each step in handling the fruit should be examined so that injury may be kept at a minimum.—Courtesy Exp. Sta. Rec.

15867. COOK, HAROLD T., and T. J. NUGENT. The influence of acid-forming and non-acid-forming fertilizer on the development of potato scab. Amer. Potato Jour. 16 (1): 1-5. 1939.—When the reaction of the soil was determined in the immediate vicinity in which the potato samples were taken the data indicated that the amount of scab infection was dependent on the pH of the soil. The type of fertilizer used had no effect on the degree of scab infection except to the extent that the fertilizer changed the soil reaction. The use of acid-forming fertilizers on scab infested soils will not prevent scab until they have lowered the reaction of the soil to at least pH 4.8.—T. J. Nugent.

15868. EDDINS, A. H. Adjusting pH reactions of soils with sulfur and limestone to control brown rot of potatoes. Amer. Potato Jour. 16(1): 6-16. 1939.—A single sulfur-limestone treatment controlled brown rot (Phytomonas solamaceara) 4 yrs. in Scranton fine sand and 3 yrs. in Bladen fine sandy loam. The treatment was made to the Scranton fine sand in 1934 and to the Bladen fine sandy loam in 1935 and consisted of an application of 800 lbs. of S to the acre in the summer followed by 3000 lb. of limestone to the acre in the fall. Brown rot was not controlled satisfactorily and a low yield of potatoes was produced in 1935 in soil which was treated with 800 lb. of S to the acre in the preceding Nov. A lethal reaction was not produced in this soil until April. The disease was controlled and a normal yield was produced in 1935 in soil adjusted to a lethal reaction by treatment in June, 1934, with 800 lb. of sulfur to the acre and readjusted to a normal reaction by treatment with 3000 lb. of limestone in Nov. In Nov., 1937, pH readings of 620 soil samples from 130 farms of the Hastings potato section varied from pH 4.4 to 6.5, with 53% of the samples reading pH 5.0-5.4. The soils became more acid from Nov. to

March, as 40 samples drawn in Nov. tested pH 4.9-5.8, whereas samples from the same locations in March tested pH 4.4-5.2. Inoculated and commercial flour S when used at the same rates to the acre produced approximately the same changes in the soil pH. Tests showed that each 100 lb. of S changed the reaction approx. pH 0.15 when used at the 400 lb. rate, and pH 0.2 when used at rates of 500, 600, and 800 lb. per acre. Equal quantities of Ca and dolomitic limestone when applied to sulfured soil produced approx. the same changes in pH. Applications of 3000 lb. of limestone per acre to soils which had been reduced to pH 3.8-3.9 gave greater increases in yields of healthy potatoes than lighter applications.—Auth. summ.

15869. FAWCETT, HOWARD S. Scaly bark in relation

15869. FAWCETT, HOWARD S. Scaly bark in relation to propagation of citrus trees. California Citrograph 24(7): 242, 262. Illus. 1939.—This restatement of some of the known facts regarding this disease stresses the probability that its occurrence in orchards planted in the future can be prevented by securing buds for propagating only from disease-free trees. The California State Dept. of Agric, has established a service to certify such trees for sources of nursery propagation material. No instance is known in which the disease has spread in orchards except from bud propagation.

-C. S. Pomeroy.

15870. FAWCETT, H. S. Disease-free parents for psorosis prevention. Pacific Rural Press 137(12): 280. Illus. 1939.—The recognition of a mosaic-like leaf symptom of psorosis and the establishment of the fact that transmission of the disease is almost entirely through budding have given impetus to a movement for a dependable service of certification of disease-free sources of propagation material for nurserymen and other budders. The Nursery Service Division of the (Calif.) State Dept. of Agric. is now making such certifications and citrus planters are demanding that the nursery trees they buy be propagated from such psorosis-free sources.—C. S. Pomeroy.

15871. GOLDSWORTHY, M. C., and E. L. GREEN. The fungicidal activity of phenothiazine and some of its oxidation derivatives. Phytopath. 29(8): 700-716. 1939.—Phenothiazine, used at the rate of 2 lb. to 50 gal. of water, with or without adjuvants, is of value as an orchard spray against apple scab. Laboratory studies show that it is also toxic to conidia of Sclerotinia fructicola and apple bitter-rot organisms. Laboratory studies of the oxidation derivatives, phenothiazine-sulphoxide, phenothiazone, and thionol, indicate that the active principle of phenothiazine is phenothiazone, and that phenothiazone is toxic in dilutions as low as 2.5 p.p.m. by volume of water. Limited phytocidal studies show that the material may be safely applied to pear, apple, plum, cherry, grape, rose, lilac, and bean foliage. Peach foliage is slightly injured by the treatments.—M. C.

Goldsworthy.

15872. KLOTZ, L. J., and H. S. FAWCETT. Brown rot of citrus fruit and its control. Pacific Rural Press 137(7): 158. Illus. 1939.—Brown rot is one of the most destructive diseases of citrus fruits but it is easy to control. The causal fungi live in the soil and attack bark, leaves and fruit. Usually only the lower fruits are affected, the water-borne spores being splashed up from the wet soil during rainy weather. Bordeaux mixture gives control in the orchard, spraying being more effective than dusting. Washing the fruit for 2-4 min. in a water or other bath at 115°-120°F is effective even in actually killing the fungus in the rinds in its early stages. The fruit should not be given this heat treatment until held for a short time after picking to prevent injury from the rupture of the oil cells.—C. S. Pomeroy.

15873. LEWIS, A. H. Manganese deficiencies in crops. I. Spraying pea crops with solutions of manganese salts to eliminate Marsh Spot. Empire Jour. Exp. Agric. 7(26): 150-154. 1939.—Three field expts. carried out in the Romney Marsh district of Kent showed that the application to the soil of heavy dressings of a soluble Mn salt had very little effect on the incidence of Marsh Spot in peas. The salt was more effective if applied when the plants were in flower, and much more effective when it was sprayed on to the foliage at flowering time.—E. H. Tripp.

15874. LINFORD, M. B., and FRANCIS YAP. Root-knot nematode injury restricted by a fungus. *Phytopath.* 29(7): 596-609. 1 fig. 1939.—Slips of *Ananas comosus* var. Cayenne were grown 15 months in plots of sterilized soil infested with

Heterodera marioni larvae, with and without cultures of 5 fungi that capture and kill various nematodes on agar. Heavy chance infestations of such fungi, occurring where no culture was added, prevented measurements of the full magnitude of beneficial action of fungi, but root-knot injury, measured by leaf and root growth, was significantly least where Dactylella ellipsospora was added. The following fungi were no more effective than the chance infestation in which D. ellipsospora was dominant: Arthrobotrys musiformis, A. oligospora, Dactylaria candida and D. thaumasia. Each fungus, where added experimentally, dominated the chance contaminants and was reisolated from a high percentage of pots after 15 months—M. B. Linford.

centage of pots after 15 months.—M. B. Linford.

15875. MILAN, ANGIOLA. Sul "carbone volante" del grano in rapporto all'accestimento delle piante. [Infection by grain smut in relation to crowding of seedlings.] Nuovo Gior. Bot. Ital. 46(1): 149-157. 1939.—Infection of wheat by Tilletia trilici and Ustilago trilici was studied for early and late and for resistant and susceptible vars. in plots sown sparsely and plots sown thickly with smutted seed. Like percentages of infection of the plant were shown in the thinly-sown and in the crowded plots, but infection of inforescence was always much greater in the crowded plots. More than 17 vars. of wheat were tested, many of the expts. being repeated in successive years and always with similar

results.-F. Ramaley.

15876. NEUMANN, HUGO. Beobachtungen über die Lebensdauer von Dauersporangien des Kartoffelkrebserregers (Synchytrium endobioticum) im bearbeiteten Felde. Zeitschr. Pflanzenkr. 49(2): 93-94. 1939.—There was no definite reduction in black wart (S. endobioticum) infection in Wohltmann var. of potato grown in fields that had been regularly worked for 3, 4, 5, or 6 yrs. or had been cropped to cereals or root crops other than potatoes.—H. Hart.

15877. PRYOR, DEAN E., and J. C. WALKER. A method for testing the toxicity of volatile compounds. Phytopath. 29(7): 641-643. 1939.—A transfer chamber is described together with a glass plate on which a sterile agar film of uniform thickness is poured and allowed to harden. From this film identical discs are cut with a sterile "biscuit cutter" and transferred to the inside of the covers of containers, either Petri dishes or pint glass-top jars. The inoculum is then deposited on the exposed surface of the agar, the material to be tested placed in the desired amt. and conc. in the bottom of the container, and the top sealed. The toxicity of the volatile substance is determined by its effect upon the growth of the fungus.—Authors.

15878. RHOADS, A. S. Limitations of the bark-scraping method in the control of gummosis and psorosis of citrus. Proc. Florida State Hort. Soc. 51: 114-127. 1938.—Bark scraping is effective in most cases for psorosis on orange trees and for both gummosis and psorosis on grapefruit trees, if done thoroughly and in the early stages. Aside from the basal form (foot rot), gummosis seems not to occur on orange trees in Florida but is widespread on both grapefruit and lemon trees, the latter being very susceptible and generally affected after attaining a few years of age. Psorosis is much the more serious disease in Florida.—Courtesy Exp.

Sta. Rec.

15879. SCHAAL, L. A. Penetration of potato-tuber tissue by Rhizoctonia solani in relation to the effectiveness of seed treatment. Phytopath. 29(8): 759-760. 1 fig. 1939.—Treatment of seed potatoes with mercury compounds gave incomplete control of R. solani in Maine. Culture of the tuber tissue from under sclerotia that had been killed by treatment showed viable mycelium present. Cross sections showed that the mycelium invaded the periderm and the tissue below, probably offering sufficient protection to prevent complete killing of the fungus by seed disinfectants.—L. A. Schaal.

15880. SELARIES, et ROHMER. La septoriose du céleri en Alsace. Ann. Épiphyties et Phytogénetique 4(3): 485-493.1 fig. 1938.—For the control of Septoria disease of celery, seed disinfection (30 min. in 2% formalin) was essential, and formalin disinfection of the seedbed was highly desirable, also 1 or 2 sprayings of the plants in the seedbeds with 1% Bordeaux mixture.—W. V. L.

15881. TUPENEVITCH, S. M., and V. N. SHIRKO. Measures for preventing losses of winter cereals in the spring from Sclerotinia graminearum Elen. [In Russ. with Eng.

summ.] Zashchita Rastenii ot Ureditelei (Defence des Plantes) [USSR] 18: 85-99. 5 fig. 1939.—S. g. becomes evident in early spring when the snow cover disappears and its mycelium and sclerotia appear on winter wheat. It is favored by warm and humid weather in autumn, heavy snow cover and late melting. It infects winter wheat and rye, timothy, French ryegrass and other grasses. Germination of sclerotia occurs in autumn on the surface of the soil provided there is sufficient light, an excess of soil moisture, and moderately low temp., 1.2-12°C. Young selerotia do not germinate; early plowing under in spring causes the destruction of many of them by bacteria, fungi and nematodes. Acid soil is regarded as favoring the fungus; liming is recommended as one of the control measures.—From Eng.

summ. by F. Weiss.
15882. WILCOXON, FRANK, and S. E. A. McCALLAN. Theoretical principles underlying laboratory toxicity tests of fungicides. Contr. Boyce Thompson Inst. 10(3): 329-338. 3 fig. 1939.—Toxicity expts. may be classified into 2 types: (a) those in which some property of each individual is meathose in which some property of each individual is measured quantitatively such as germ-tube length, diam. of colonies, etc.; (b) those in which the individuals are divided into 2 categories such as germinated and nongerminated spores. The toxicity curves obtained in method (b) are the result of the fact that each individual spore has its own particular lethal dose, and there is a distribution of individual lethal doses which is usually normal when plotted against the logarithm of the conc. The problem in toxicity expts. is to deduce the properties of the curve of individual lethal doses from the toxicity data obtained. Two rapid approximate methods of doing this are described and examples given. These methods lead to an estimation of the LD50 value, that is, the conc. preventing 50% germination, and the range within which it may be expected to lie 19 times out of 20. The methods may be extended to provide an estimate of the LD95 and its corresponding zone of error if desired. When fungicides are to be compared which have been run at different times or in different laboratories, they should be rated in terms of a standard which is run at the same time as the unknown. In this way errors due

to many obscure causes may be reduced.—Auth. summ.

15883. YOUNG, H. C., and H. F. WINTER. The control of cherry leaf spot. Ohio Agric. Exp. Sta. Bimo. Bull. 24 (199): 100-103. 1939.—Results of orchard-spraying tests conducted in Ohio over a period of 3 yrs. (1936-1938) indicate that the fixed C. companying used with lime are dicate that the fixed Cu compounds used with lime are much more effective in control and cause less damage to the foliage than lime-sulfur. Lime-sulfur and wettable sulfurs failed to give commercial control of leaf spot 2 years

out of the 3.-Authors.

MISCELLANEOUS

15884. BLAISDELL, DOROTHY J. A permanent transferable culture-tube label. Phytopath. 29(8): 761-762. 1939. This tin-backed label is a split cylinder 14 inches long and 2 in. in circumference. A 4-inch, metal edge with 45° bevelled corners is folded outward over the face of the cardboard. The label slips easily over the edges of tubes of various sizes and grips them tightly.—D. J. Blaisdell.

15885. FINDLAY, W. P. K. Effect of sap-stain on the properties of timber. II. Effect of sap-stain on the decayresistance of pine sapwood. Forestry 13(1): 59-67. 1939.—A description is given of a series of laboratory tests made to discover whether blue-stained sapwood is more liable than sound clean sapwood to attack by the fungi which cause dry rot in building timbers. The stained sample blocks isually lost slightly more weight from decay than the clean blocks during the period of test. Blue-stained wood absorbed water more rapidly than clean wood, and it is suggested that this greater porosity may be the reason why stained wood is decayed somewhat more rapidly than clean wood. The rates of seasoning of blue-stained and of clean pine planks were practically identical. Since all sapwood has a low natural resistance to wood-destroying fungi, slight variations in this resistance are not of practical importance. From the point of view of resistance to rot, the presence of blue stain need not be regarded as a defect.—W. P. K. Findlay.

15886. GIDDINGS, N. J. A small cage for insect vectors used in plant inoculations. *Phytopath*. 29(7): 649-650. 1939.

—A cloth-covered glass cage 22 mm. in diam. by 22 mm.

high is held in place on a ground glass base by 2 stainless steel coil springs attached to brass cross pieces under base and over top.—N. J. Giddings.

15887. HAHN, GLENN G. Susceptibility of seedlings of Ribes punctatum, an Andine currant, to Cronartium ribicola. Phytopath. 29(7): 643-644. 1939.—Very little work has been done with regard to the susceptibility of S. American spp. of Ribes to C. ribicola. So far as known the susceptibility of one of these, Ribes punctatum, is reported for the first time. This tender, evergreen, dioecious, Andine species should be useful as a source of inoculum for white pine blister rust investigations carried on in the greenhouse during the late autumn and winter at a time when N. American and European Ribes have dropped their leaves.-G. G. Hahn.

15888. PEACE, T. R. Forest pathology in North America. Forestry 13(1): 36-45. 1939.—This paper is based on a 4-months' tour of America made in the summer of 1938. The more outstanding tree diseases of N. America are briefly described and references given to the more recent work on them. American and European conditions are compared. It is concluded that hope for the future lies in international co-operation over breeding of resistant strains and over raising of disease-free stocks rather than in stricter quaran-

tine regulations.-T. R. Peace.

15889. The Plant Disease Reporter, October 15 and November 1 and 15, 1938. U. S. Dept. Agric. Plant Disease Reporter 22(19): 379-392. 2 fig.; (20): 393-409. 1 fig.; (21): 411-441. 2 fig. 1938.—The following items are of interest: No. 19. Cotton rust (Puccinia schedonnardi) in Arizona, by J. G. BROWN; tobacco diseases in Kentucky, 1938, by W. D. VALLEAU and E. M. JOHNSON; onion disease situation in Massachusetts summarized, by O. C. BOYD; peach yellows in Tennessee; Colletotrichum graminicolum on grasses in Maryland and Virginia, by C. L. LEFEBVRE and H. W. JOHNSON; semiarid climate of value in seed production, by H. P. BARSS; and plant disease fungi and various molds associated with human disease.—No. 20. Yellow-red virosis (X-disease) of peach and chokecherry, by E. M. HILDEBRAND and D. H. PALMITER; the by E. M. HILDEBRAND and D. H. PALMITER; the keeping quality of cranberries in Massachusetts in 1938, by H. F. BERGMAN; Persian walnut and filbert diseases in the Pacific Northwest in 1938, by P. W. MILLER; bacterial wilt of sweet corn in 1938, by C. ELLIOTT; lodging of sorghum in Texas associated with Sclerotium balaticola infection, by A. A. DUNLAP; Phytophthora crown canker of dogwood (Cornus florida), by D. S. WELCH; diseases of fruits and vegetables on the New York market during the months from May to Sept. 1938, inclusive, by C. O. BRATLEY and J. S. WIANT; and brief notes on "black pox" fruit spot of apples in Indiana. "weak neck" disease pox" fruit spot of apples in Indiana, "weak neck" disease of sorghum in Kansas, and further spread of Dutch elm disease.—No. 21. Late blight and other potato diseases in 1938—reports from various States, including New Hampshire, Vermont, Massachusetts, New York, New Jersey, Delaware, Maryland, Virginia, West Virginia, Ohio, Michiery Williams, West Virginia, Ohio, Michiery West Virgin gan, Wisconsin, and Minnesota; plant pathology in fiction; the reactions of introduced bean varieties to rust (Uromyces phaseoli typica) in Hawaii, by G. K. PARRIS—(Bean rust was first reported from the Hawaiian Islands in 1918, but apparently has never assumed serious proportions until recently. In 1937 it suddenly developed in epidemic proportions on the most widely grown variety, viz., Lualualei, on several of the islands. This race of bean rust was tested on 43 vars. in Hawaii and sent to L. L. Harter of the Bureau of Plant Industry for confirmatory tests. The Hawaiian rust is considered distinct from forms No. 1 and No. 2); Botrytis infection of onion leaves and seed stalks, by C. E. YARWOOD: black pox fruit spot (Helmintho-sporium papulosum) of apples in Pennsylvania in 1938, by R. S. KIRBY and A. H. BAUER; recovery from silver leaf (Stereum purpureum) of Montmorency cherries, by W. D. MILLS; brief notes on strawberry diseases, including low stand of strawberry plants in eastern N. Carolina, Sept. 1938, and nonyellowing stocks of Blakemore strawberry; leaf rust on fall wheat in Oklahoma, by C. C. BROWN; Coleosporium vernoniae on Pinus rigida in Illinois, by J. C. CARTER; frost injury to woody plants in Illinois in May 1938, by J. C. CARTER; distribution

of popcorn disease (Sclerotinia carunculoides) of mulberry, by A. E. JENKINS and E. A. SIEGLER; and potato diseases in Minnesota, by J. G. LEACH.—Courtesy Exp.

15890. The Plant Disease Reporter, March 1 and 15, 1939. U. S. Dept. Agric. Plant Dis. Reporter 23(4): 55-77. 4 fig.; (5): 79-88. 1 fig. 1939.—IV. Cephalosporium wilt of persimmon in the Southeast, by B. S. CRANDALL; spread of white pine blister rust in 1938 (with map and tabulated detail); Fusicladium robinae and Macrosporium sp. in forest tree nurseries (with tabulated data), by W. C. DAVIS and R. W. DAVIDSON; diseases of fruits and vegetables (apples, celery, grapes, olives, onions, oranges, peas, pears, peppers, pomegranates, squash, tangerines, and tomatoes) on the New York market during the months of October, November, and December, 1938, by J. S. WIANT and C. O. BRATLEY; symptoms of bacterial wilt and rot (bacterial ring rot) of potato; smutty wheat receipts continue decline, by B. W. WHITLOCK; smutty wheat trends downward on the Minneapolis market, by R. J. HASKELL; six-year study shows when to expect freeze losses in winter wheat; brief notes on Sclerotinia stem blight on stocks in California, wheat rusts in Kansas, and cereal diseases in California; and new diseases or new distribution reported in the literature (discovery of citrus canker in New Zealand, a bacterial disease of stocks in New South Wales and *Phytophthora* disease of hops in New Zealand).—V. Incidence and imnsease of hops in New Zeatand,—V. Indented and importance of quince rust (Gymnosporangium clavipes) on apple as affected by environmental and developmental factors, by P. R. MILLER; tobacco downy mildew situation in Florida, by W. B. TISDALE and R. R. KINCAID; possible cause (Curvularia lunata?) of black kernels in rice, by A. L. MARTIN; adverse weather brings most loss to wheat crop; diseases of shade and ornamental trees-

summary of specimens received in 1938 at the New Haven (Conn.) office, division of forest pathology, by A. M. WATERMAN; and brief notes on losses from corn ear rots in Illinois, *Thielaviopsis basicola* on geranium in Connecticut, and tobacco downy mildew in North Carolina.-

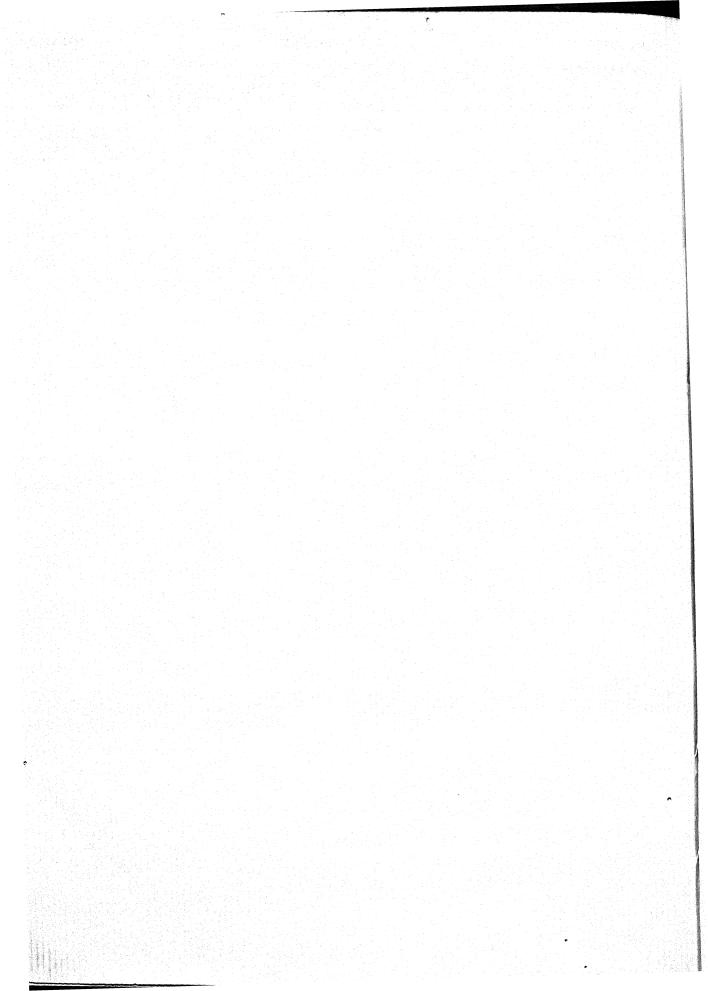
Courtesy Exp. Sta. Rec.

15891. [Plant disease studies.] Virginia Acad. Sci. Proc. 1938: 40, 41, 43, 45. 1938.—Abstracts of the following papers are included: Influence of Temperature on the Development of the Tobacco Downy Mildew Disease, by R. G. HENDERSON; Effect of Four Years of Barberry Eradication on Stem Rust of Cereals in Virginia, by G. E. MATHENY; A Fusarium Disease of Spinach, by H. T. COOK and T. V. NUGENT; Methods of Sterilizing Plantbed Soil, by R. G. HENDERSON; and An Improved Technique for Demonstrating Rust Hyphae and Haustoria in Unsectioned Leaf Tissue, by M. McBRYDE.—Courtesy Exp. Sta. Rec.

15892. WARDLAW, C. W. Banana diseases. 12. Diseases of the banana in Haiti, with special reference to a condition described as "plant failure." Trop. Agric. [Trinidad] 15(12): 276-282. 1938.—The diseases discussed are alkali chlorosis, Cercospora leaf disease, Panama disease, Bacterial wilt disease, Marasmius stem rot, heart rot, cigar end, sun scald, "May" bunches, virus heart rot, and thrips injury.

—W. D. Pierce.

15893. ZELLER, S. M. Diseases of strawberry. Oregon Agric. Exp. Sta. Bull. 357. 23-30. 7 fig. 1938.—This is a brief presentation of important facts regarding diseases of this crop due to viruses (crinkle, yellows, and witches' broom), fungi (Mycosphaerella fragariae leaf spot, leaf scorch, leaf blight, mildew, Armillaria crown rot, and root and fruit rots), nematode gall, and alkali yellows.—Courtesy Exp. Sta. Rec.



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ECOLOGY

Editors

W. C. ALLEE, General Animal Ecology G. D. FULLER, General Plant Ecology CHANCEY JUDAY, Hydrobiology (Oceanography, FREDERICK A. DAVIDSON, Ecology of Wildlife! Management—Aquatic
L. McATEE, Ecology of Wildlife Management— Terrestrial

ROBERT G. STONE, Bioclimatology, Biometeorology

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16230. ARCTOWSKI, HENRYK, (compiled by). A bibliography of scientific papers on climatic variations. 254p. Mimeographed. International Geographical Union, Com-

mission of Climatic Variations: Lwow, 1938. 16231. BILHAM, E. G. The climate of the British Isles; being an introductory study of official records for students and general readers. xix+347p. 2 pl. British Meteorological Office: London, 1938.—This is a very thorough and up-todate treatise; it will probably for years be the chief reference on British climate, outside the annual "British Rainfall" reports and the extenso climatological data reports regularly issued by the British Meteorological Office. Bibliographies

at the end of each chapter.—R. G. Stone.

16232. BREZINA, E., und W. SCHMIDT. Das künstliche Klima in der Umgebung des Menschen. viii +212p. 22 fig. F. Enke: Stuttgart, 1937.—A professor of hygiene and a professor of meteorology cooperated to write this book on the climate which man has created, partly purposely and partly involuntarily, around himself. The late W. Schmidt was so well known an authority on small-scale climate that this, his last work, will find due attention among meteorologists. The artificial climate—air conditioning—has already gained such importance in everyday life that a scientific discussion of underlying facts and principles is a necessity. The climatic elements for such discussion are: temp. and air movement, singly and combined as cooling power; humidity, air suspensions; and radiation. The heat balance of the human body and the effect of clothing upon it are discussed. The house and its properties as protection against climatic effects; the climatology of a room with the important details of heating and ventilating are presented. Climate of working places and climatization machinery find short consideration. The rest of the book is devoted to peculiarities of city climate, smoke, dust, and air-borne

disease. Observational data, which ably illustrate the various items, are mostly taken from central European material; also the quotations from the literature are mostly restricted to references in the German language. Some of the radiation and temp. tables have not been published heretofore and give mostly material collected in and near Vienna. The important factor of "dust" might have been more adequately dealt with; practically no word is offered about dust in factories and mines, etc. As a whole the book should be stimulating not only to meteorologists, pointing toward important applications and new research, but also to architects and city planners. It is a piece of pioneer work and should be commended particularly because of the close cooperation of 2 fields which have so many inherent relations but where research workers on either side are usually so far apart.—H. Landsberg.

16233. BRUNT, D. Physical and dynamical meteorology. 2nd ed. 428p. Illus. University Press: Cambridge, England, 1939.—The standard and most up-to-date treatise in English on physical meteorology; presumes some mathematical and physical knowledge and is intended as a text for advanced students and as a reference on fundamentals. The wavetheory of cyclones and isentropic analysis are not discussed, however, and the descriptive meteorology and synoptic meteorology are not covered so extensively nor authorita-

tively.-R. G. Stone.

16234. DEAN, L. A. Relationships between rainfall and coffee yields in the Kona District, Hawaii. Jour. Agric. Res. 59(3): 217-222. 1 fig. 1939.—Statistical analyses of data on rainfall and coffee production for the years 1901 to 1936 in the Kona district of Hawaii show 2 distinct periods of heavy rainfall and 1 period of markedly light precipitation. The dry season occurs during the winter, and the months that have low mean rainfall have the most irregular rainfall. Much of the variability in annual coffee production may be ascribed to fluctuations in the Feb. to June rainfall occurring during the years in which the fruiting wood was produced. The regression of coffee prod. (y) in millions of lbs. per annum with (e) the early rainfall from Feb. to June, and (t) the time in years, which was derived from various partial coefficients, was y=0.285t+0.08e-1.67, and this gave fairly accurate forecasts of production.-L. A. Dean.

16235. GARNETT, ALICE. Insolation and relief, their bearing on human geography of alpine regions. Inst. British Geographers Publ. 5. 1-71. Illus. 1937.—Useful for technical discussion of distribution of sunshine on alpine slopes.-

16236. HOUGHTEN, F. C., C. GUTBERLET, and A. A. ROSENBERG. Summer cooling requirements in Washing. ton, D. C., and other metropolitan districts. Heating, Piping and Air Conditioning 11: 587-591. 1939.—Comfort studies on 73 men and women working in the cooled offices of the Federal Reserve Building, Washington, D. C., confirm previous laboratory and field studies in that an effective temp. of about 71°F is the most popular in warm weather after the occupants have become adapted to the cooled atmosphere.— C. P. Yaglou.

16237. HOUGHTON, H. G., and W. H. RADFORD. On the measurement of drop size and liquid water content in fogs and clouds. Massachusetts Inst. Technol. and Woods Hole Oceanogr. Inst. Papers in Phys. Oceanogr. and Meteorol. 6(4): 1-31. 1938.—The possible methods of measuring fog

particles are critically reviewed. It is concluded that the only suitable method of obtaining the distribution of drop sizes present in a given fog consists in the microscopic measurement of large numbers of drops which have been collected on a properly surfaced slide. A method for surfacing microscopic slides with a thin, uniform layer of petroleum grease is described. The important problem of obtaining a representative sample of drops on a slide is next considered. Exptl. results indicate that slides no larger than 5 mm. square will collect satisfactory samples if exposed facing the wind. Larger slides discriminate against the smaller drops. Special fog microscopes which have been constructed for observing droplet samples are described, and typical results obtained in natural fogs are presented. Although 40 sets of data have been procured in 16 fogs, it has not been possible to correlate the drop-size data with any of the accompanying meteorological conditions. There is no evidence of mass grouping, such as Kohler observed in clouds; however, definite conclusions cannot be drawn from such a small amt. of data. The usefulness of fog-water data is small and the data. The distributions of rogenizer data is indicated and possible methods of procuring them are reviewed. An investigation of the sampling problem encountered in the operation of the apparatus is discussed. The essential part of the new instrument is a unit comprising a succession of ordinary wire screens through which a motor-driven fan forces foggy air at a measured rate. The central portion of this screen unit is removable for weighing. Liquid water determinations are made from the weight increments of this unit corresponding to the passage through it of a known volume of air as indicated by a vane anemometer. The outer section of the screen unit serves as a guard ring for the central measuring unit, thereby avoiding sampling errors, and at the same time functions as the collector of samples of fog water for chemical analysis. From the results of numerous measurements it has been determined that in the typical advection fogs which occur at Round Hill the liquid water content may range up to 0.25 g/m³. Total dissolved salt contents of from 8 to 480 mg/l have been observed. The number of drops per cc. of foggy air is usually less than 5.—Auth. abst.

16238. LAMB, H. H. Industrial smoke drift and weather.

Quart. Jour. Roy. Meteorol. Soc. [London] 54(277): 639-643. 2 fig. 1938.—Local data from Scotland are presented as showing that drift from industrial smoke pollution of the air may give rise not only to fog but also to slight rain or drizzle and lowered cloud.—Courtesy Exp. Sta. Rec. 16239. LEWIS, A. D. Rainfall normals up to the end of

1935 (Union of South Africa). 162p. 4 maps. Dept. Irrig., Meteorological Office: Pretoria, 1939.—Ten more years' records are made available than in the previous publication on the subject (1925) and the average annual isohyetal map (1:1,500,000) by A. D. Lewis is here much improved owing to availability of the new topogr. map of the Union on 1:500,000, the isohyets being interpolated with regard to topography. Extensive tables give the monthly and annual normals in inches (to 100ths) for over 5,000 stations. No descriptive text as the text in the 1925 report is still valid. The new data indicate greater area of dry land and desert in the low veld and Basutoland than previously believed .-R. G. Stone

16240. LOEWY, A., and E. WITTKOWER. The pathology of high altitude climate, with contributions to the climatology of highland regions and to the constitution of high-altitude inhabitants. 212p. Oxford Med. Publ.: London, 1937.—Authoritative, thorough work. Bibliography.—R. G.

· Stone. 16241. MIEGHEM, J. van. Prévision du temps par Vanalyse des cartes météorologiques. Inst. Belge de Recherches Radioscientifiques. 6: 1-138. 2 maps, 58 fig. 1936. The author is an accomplished disciple of the Bergen School in both the theoretical and synoptic spheres. This ittle book is a very clearly written and beautifully illustrated presentation of the elements of air mass and frontal analysis, a synthesis of the various papers of the Norwegian practitioners. Though the treatment of each point is rather brief a surprisingly comprehensive array of topics is covered. The procedure in analyzing actual maps is cuttlined and some everyoles on twicell western European is outlined and some examples on typical western European situations shown.—R. G. Stone.

15243. MOERIKOFER, W. Meteorologische Strahlungs-

messmethoden für Mediziner und Biologen. Fundamenta Radiologica 4: 36-52. 1939.—A survey is given of some especially newer methods for measuring the radiation from sun and sky which for reason of their simplicity and moderate cost are well suited for biological radiation researches. The limit of errors which can be admitted for such researches is taken as ±10%. The importance of integrating instruments giving the amts. of radiation over a longer period is pointed out as well as the necessity of taking into consideration also the diffuse sky radiation besides the direct sun radiation. The rectifier-photocell is recommended for the determination of momentary values of radiation from sun and sky. Also recommended for this purpose are the double-thermometer in a single glass container, thermoelectric pyranometers and solarimeters, and the u.-v. dosimeter for ultraviolet radiation. For measuring daily amts, of radiation the bimetallic actinograph will be suitable, also the distillation lucimeter, the grey-wedge-photometer and the solarimeter combined with a milli-

ampere-hour counter.—V. Conrad.

16244. MORIN, H. G. S., et P. CARTON. Contribution à l'influence des facteurs climatiques à la repartition de l'endemie palustre en Indochine. Renseignements techniques d'Indochine, Service antipaludique des Institute Pasteur et

Service meteorologique de l'Indochine pp. 459-480. (1930). 16245. PLAMENEVSKII, M. N. [On the greatest admissible distance between the points of observation of at-mospheric precipitation.] [In Russ. with Eng. abst.] Bull. Observ. Géophys. Central (U.S.S.R.) 1. 34-36. 1933.—The au-thor applies the criteria of randomness of a series of observations (see: Weinberg; Recueil de Geophys., 1929, v. 7, p. 1-36) to the published precipitation data from third-order ("cooperating") stations of the U. S. Weather Bureau in Ohio and Pennsylvania for the years 1920-29 and comes to the conclusion that a distance as great as 20 km, and perhaps up to 40 km, is admissible for the average distance between stations of such a network. In the same Bulletin, p.17-22, an article by Weinberg and Plamenevskii discusses the same problem with respect to temp. observations, using Russian climatological data, computing the criteria along isotherms. They conclude that for mean annual temp. even 75 km is too big an average separation of the stations.—R.G.

16246. ROSS, F. W., and C. L. UTTERBACK. Intensity fluctuations in components of solar radiation with atmospheric conditions. Cons. Perm. Internat. Explor. Mer Jour. Conseil 14(2): 193-200. 1939.—The dependence of variations in the wave-length-intensity distribution upon atmospheric conditions is shown by a study of the fluctuations on different days. Three days were chosen as characteristic of clear, cloudy, and hazy days. The response of 5 temp-controlled photocells, provided with selected filters, indi-cated that the variations in intensity of spectral components are functions of the wave-length band as well as conditions existing in the atmosphere at the time of observation. For comparison the observations, tabulated and graphed, are reduced to percentages of the twelve o'clock value for each day. The variations show that the observed intensity of a any. The variations show that the observed intensity of a particular band is not a criterion of either the simultaneous intensity of any other spectral band or of the integrated response of the type of cell employed.—Authors.

16247. SVERDRUP, H. U. Second note on the logarithmic law of wind structure near the ground. Quart. Jour. Roy. Meteorol. Soc. [London] 65(278): 57-60. 2 fig. 1939.—The wither critically reviews his appropriate and that of others.

author critically reviews his own work and that of others and presents formulas and graphs, concluding that very near the boundary surface stable and unstable conditions influence the wind profile and the eddy convectivity according to the same law, that certain observations can be interpreted as showing that the roughness parameter of the surface is a well-defined physical quantity, and that the influence of stability can be expressed by means of a nondimensional constant. He believes that the wind profile at greater distances from the boundary surface is represented better by a power than by a logarithmic law.—Courtesy Exp. Sta. Rec.

16248. THORNTHWAITE, C. W., and BENJAMIN HOLZ-MAN. The determination of evaporation from land and water surfaces. U. S. Dept. Agric. Month. Weather Rev. 67(1): 4-11. 2 pl., 5 fig. 1939.—The importance and com-

plexity of the problem of determining rate and amt. of evaporation from land and water surfaces or transpiration from vegetation are stressed. A method for determining evaporation from either land or water areas is presented in this preliminary report and its practicability is said to be demonstrated. It is also hoped that with proper instrument installation it will become possible to determine transpiration rates and moisture requirements of various field crops and forest trees, the effectiveness of various moisture-conserving practices and the relative importance of evaporation and transpiration in the hydrologic cycle. The method used is based on W. Schmidt's Austausch (eddy exchange) principle, and consists in measuring the unit area vertical transport of vapor by two sets of wind, temperature and humidity recorders, at two different heights above the ground. Once all the practical difficulties are eliminated, ecological research can make a great advance by computing climatic influences from actual water losses or gains so measured. It is interesting to note that when dew or hoar frost forms there is a "negative evaporation," i.e. deposition of water, measured by the apparatus.-R. G. Stone.

ANIMAL

16249. PARK, THOMAS, ELLA VIRGINIA MILLER, and CATHARINE Z. LUTHERMAN. Studies in population physiology. IX. The effect of imago population of Tribulium the duration of the larval and pupal stages of Tribolium confusum Duval. Ecology 20(3): 365-373. 1939.—When a series of T. confusum populations are established consisting of a constant number of larvae (10) but a geometrically increasing number of imagoes (1, 4, 16, 32, 64) the following effects are noted: The duration of the larval period is extended as the density of the imagoes increases; the larvae living in crowded imago cultures grow more slowly in terms of body weight than those in less crowded cultures; and the duration of the pupal period is not significantly affected by the crowding of larvae with imagoes. These facts are related to the ecology of populations and shown to have significance in contributing to the explanation of the decline of T. cultures.—Auth. summ.
16250. WEBER, NEAL A. Tourist ants. Ecology 20(3):

442-446. 1939.—Of the 16 spp. of ants taken on ships in the 442-440. 1939.—Of the to spp. of after the sum of sings in the American tropics, 9 spp. are well-known ants which are widely distributed in the tropical and warm temperate regions of the world. Two other kinds not found on these ships with the above 9 constitute the 11 cosmopolitan spp. of ants; 1 of these 2 was found in luggage in the U.S. upon return from Cuba. *Monomorium pharaonis* was taken on 6 ships. This species and Paratrechina longicornis are probably the most common ship ants and may be expected on any vessels visiting ports in warm regions. A single ship carried 7 of the 11 spp. of cosmopolitan ants; 5 of these appeared to be regular inhabitants. Worker ants are regularly carried into ships in cargo and passenger luggage. When a queen is carried in cargo, a colony may become established on the ship or deposited with the cargo in an alien port. Factors governing the establishment of ants in alien lands include climate, available food, etc., but, above all, an adaptability which seems to be specific, and, in *Monomorium*, generic.—*Auth. summ*.

16251. BAKER, H., and A. R. CLAPHAM. Seasonal variations in the acidity of some woodland soils. Jour. Ecol. 27 (1): 114-125, 4 fig. 1939.—Acidity detns. were made monthly for 5 yrs. on the upper and lower layers of the soil in 7 stations representing 3 types of woodland soil. Statistically significant annual and monthly variations in acidity were found in all 3 types. The annual variations can be related to variations in total annual rainfall. The acidity of gravels is increased but that of clays and loams decreased during years of low rainfall. The monthly variations are in part related to large monthly variations in rainfall, but there is some evidence also of an annual rhythm in acidity. The acidity changes are ascribed to changes in micro-organic activity and, in the heavy soils, to the capillary ascent of base-rich water during dry periods.—Authors.
16252. BEAVEN, GEORGE FRANCIS, and HENRY J.

OOSTING. Pocomoke Swamp: A study of a cypress swamp

on the eastern shore of Maryland. Bull. Torrey Bot. Club 66(6): 367-389. 1939.—This swamp is probably the most northern extensive area of its kind. The vegetation is dominated by cypress (*Taxodium distichum*), swamp blackgum (Nyssa biflora), and red maple (Acer rubrum), and poor drainage and light result in a limited growth of associated species. The greatest variation in dominants and sub-ordinates is related to tide and drainage. The moisture factor results in nearly pure stands of white cedar (Chamaecyparis thyoides) near the upland borders and pure stands of cypress along the deeply flooded river margins. The transition from swamp to upland has the greatest variety of shrubs and herbs with an abundance of evergreens indicating the xeric nature of the habitat and showing resemblances to the pocosins of the South. Open, raised, sandy areas within and bordering the swamp are characterized by pine-barren species. The flora is more closely related to that of southern swamps than northern bogs. An analysis of the ranges of species collected indicates a preponderance of southern spp. and bears out evidence that migration has been progressing from the southeastern U.S. If left undisturbed, it appears that the swamp flora will remain essentially stable for some time to come. A complete list

of spp. collected is appended.—H. J. Oosting.
16253. CHAPMAN, V. J. Studies in salt marsh ecology.
IV and V. Jour. Ecol. 27(1): 160-201. 12 fig. 1939.— Section IV comprises an analysis of the salinity, exchangeable Na and Ca, and the moisture factors of salt marshes in Norfolk. Moisture is not a significant factor. The exchangeable Na behaves independently of the total chloride and it is suggested that the ion may be bound in the colloidal clay soil. Total chloride falls in the spring in the surface layers and this probably encourages seed germina-tion. The upper and lower marshes contrast strongly in the summer as to surface salinity. Section V describes the

the summer as to surface salinity. Section V describes the algal vegetation, 16 communities being recognized. This vegetation is compared with that from other British salt marshes.—V. J. Chapman.

16254. CLAPHAM, A. R., and B. N. CLAPHAM. The valley fen at Cothill, Berkshire. Data for the study of post-glacial history. II. New Phytol. 38(2): 167-174. 3 fig. 1939.—Certain water-filled depressions at Cothill were indepth of peat were recorded along a number of transects both of the main and subsidiary valleys. The contours of the valley floor and peat surface were mapped. Pollen samples were collected. The stratigraphy of the valley ten is explained with the aid of a contour and a profile chart

together with an analysis of the peat deposits—J. R. King. 16255. DEEVEY, E. S. Jr. Studies on Connecticut lake sediments. I. A postglacial climatic chronology for southern New England. Amer. Jour. Sci. 237: 691-724. 11 fig. 1939. Eight profiles from 5 lakes and bogs in southern Connecticut were analyzed for fossil pollen. The resulting vegetational sequence is employed as a climatic chronology, and attempts are made to correlate the succession of events with other pollen chronologies in eastern North America. Because of the chronologic uncertainties created by the irregular de-glaciation of Connecticut, the sequence can not be directly related to varved-clay chronologies, and it is suggested that all North American pollen profiles are probably incomplete, since they have been secured from kettles in which initial deposition did not coincide with the inception of deglaciation. The vegetational succession is divided into 6 periods: Period A-1, spruce-fir (cool); period A-2, spruce-maximum (last oscillation of ice-border in New Haven region, cooler); period B-1, pine (warmer, dry); period C-1, oak-hemlock (warm, moist); period C-2, oak-hickory (warm, dry); period C-3 (at stations near the coast) oak-chestnut (warm, moist). During period C-3 a dichotomy is evident, in that the northernmost profile (near Middletown, ca. 30 miles inland) is characterized by spruce-hemlock (cool, moist). The evidence that local oscillations of the ice-border may be accompanied by climatic deterioration (period A-2) consists companied by climatic deterioration (period A-2) consists in part in a demonstration of comparable relations in Indiana, Wisconsin, and Illinois. Particularly close resemblances to the Connecticut sequence are found in eastern Canada (Auer) and Ohio (Sears). The hickorymaximum (C-2) during the mixed-deciduous forest period is tentatively correlated with the world-wide climatic oprevealed that although the weed species are characterized by a slight degree of heterogeneity, the densities of some species may be determined. The difference between the observed and calculated densities is insignificant for those spp. where the agreement with the calculated Poisson series terms is significant. When the relationship between the quadrat size and the average number of species found within the quadrat size is studied, a disagreement between the field and calculated data is revealed which however improves when the less common species are excluded. The disagreement is correlated with the heterogeneity in the distribution of the individuals of the weed spp.—Auth.

16268. STEPHENS, C. G., and R. F. CANE. The soils and general ecology of the north-east coastal regions of

and general ecology of the north-east coastal regions of Tasmania. Papers and Proc. Roy. Soc. Tasmania 1938: 201-207. Map, 1 pl. 1939.

16269. TURNER, JOHN S., and A. S. WATT. The oakwoods (Quercetum sessiliflorae) of Killarney, Ireland. Jour. Ecol. 27(1): 202-233. 2 pl., 9 fig. 1939.—A natural oakwood near Killarney, south-west Ireland, is described. The wood grows on your sold meanly redecified soil in a region beauty. grows on very acid, mostly podsolized soil in a region characterized by a pronounced oceanic climate—high rainfall, high N/S ratio and for its latitude a high mean annual temp. with a small range. The dominant tree (Quercus sessiliflora) is deciduous but the abundance and vigor of the evergreens lex aquifolium, Calluna vulgaris, Vaccinium myrtillus (green shoots) etc., the wealth of bryophytes both in species and individuals, and the ferns Hymenophyllum tunbridgense and H. peltatum, suggest the nearest approach to evergreen hygrophilous forest possible with the limitations imposed by past climatic sifting of the flora. The wood exists in 3 varieties related to 3 stages in podsolization of the soil: comparative data for size and number of the important spp., and accurate profile transects of the vegetation are given and accurate profile transects of the vegetation are given for the 3 types. These data are obtained from representative plots 25 ft. × 75 ft. to 125 ft. The development of the vegetation is described from one place: bare rock with occasional plants in cracks $\rightarrow Ulex\ gallii - Calluna\ vulgaris\ heath <math>\rightarrow Ilex\ aquifolium - Arbutus\ unedo\ scrub \rightarrow Quercus\ sessilifora\ woodland summarizes the succession. Arbutus is a plant of serial stages: in W. Iroland it is a light leving$ a plant of serial stages: in W. Ireland it is a light-loving plant and cannot survive the shade of the oak but may survive in the one type where the oak does not grow taller than the Arbutus. A summary of the distribution of the bryophytic communities and their succession on the trees and boulders is given. The full account of P. W. Richards is given in Annales Bryologici 11, 108, 1938.—A. S. Watt.

OCEANOGRAPHY

16270. BERNARD, FRANCIS. Étude sur les variations de fertilité des eaux Méditerranéennes. Climat et nanoplancton à Monaco en 1937-38. Cons. Perm. Internat. Explor. Mer Jour. Conseil 14(2): 228-241. 1939.—This is the summary of 3 yrs.' research on the nanoplankton and its relation to the Mediterranean climate. In winter the sea is isothermic, and the vertical exchanges of water are due to differences of salinity. (The volume of nanoplankton was greater in 1937 because the rainfall was greater than in 1938.) In summer, vertical changes of temp are the most important source of local fertility. In spring and autumn, the wind seems to be the principal agency affecting life in the sea; sunshine is almost always sufficient for marine photo-synthesis, and weak exchanges of water are the cause of scarcity of organisms. The greatest maxima of Protista occur at the same time in every year, because in the Mediterranean the maxima of wind and rain are rather regular. Coccolithus fragilis is the commonest Flagellate.—F. Bernard.

16271. FLEMING, RICHARD H. The control of diatom populations by grazing. Cons. Perm. Internat. Explor. Mer Jour. Conseil 14(2): 210-227. 1939.—The fluctuations in diatom populations must be largely detd. by variation in the intensity of grazing. The specific problem considered is that of the development of a large diatom population in a given water mass and its subsequent disappearance. An equation is presented to express the change in population when it is assumed that the diatoms divide at a constant rate and that the fraction of the population removed each day by grazing increases. If the division rate of the diatoms

is known it is possible to compute the production. The production represents the increase in the number of diatoms over and above the original population and includes those which have been consumed by the grazers. The fraction of the population consumed each day is shown to depend upon the number of grazers as it has been observed that these feed by "filtration" and that the filtration capacity is independent of the diatom population. The equations developed are applied to data from the English Channel.— R. H. Fleming.

16272. GIBBONS, S. G. The Hensen net. Cons. Perm. Internat. Explor. Mer Jour. Conseil 14(2): 242-248. 1 fig. 1939.—The incorrect sampling by various plankton nets due to size of organism and differing local conditions is discussed in the light of clogging of the net. Comparison of catches between Hensen and Standard silk nets under widely varying conditions shows a 500% discrepancy. Remarks are included on the scarcity in a small volume of water of even abundant forms, and attention is drawn to the advantages of the modern centrifugal pump. A reiteration of the difficulties with vertical nets due to ship drift concludes the

paper .- S. G. Gibbons.

16273. RUSSELL, F. S. Hydrographical and biological conditions in the North Sea as indicated by plankton organisms. Cons. Perm. Internat. Explor. Mer Jour. Conseil 14(2): 171-192. 1939.—The article is a summary review of recent work on the use of plankton organisms for indicating water movements and biological conditions in the North Sea area. Our knowledge of the indicator species for the different types of water is outlined and the bearing of this work on fishery research is discussed. A bibliography of references dealing with this research in the North Sea area is given.—F. S. Russell.

LIMNOLOGY

(See also in this issue Entries 16277, 16283)

16274. BERG, KAJ. Studies on the bottom animals of Esrom Lake. K. Danske Videnskab. Selsk. Skrifter Nat. Og Esrom Lake. K. Danske videnskab. Setsk. Skrijter Nat. Og Math. Afd. Ser. 9. 8: 1-255. 17 pl., 183 fig. 1938.—The area of the lake is 17.3 sq. km., the max. depth 22 m. and the mean depth 12.3 m. It belongs to the eutrophic class since the lower water contains very little dissolved oxygen in late summer and early fall. The Ca content of the water is 39-42 mg. per 1. and Mg 52-56 mg. per 1. The bottom samples were taken along a single line extending from 0.2 to 20 m. 12 series of double catches were taken at 7 different depths during a period of a little more than a year; many other double samples were taken to supplement the observations on certain animals. On the basis of the results 3 zones are indicated: (1) the littoral, occupied by rooted plants, 0-4 m.; (2) the sublittoral or transitional, occupied chiefly by the mollusk Dreissensia polymorpha, 4-15 m.; (3) the profundal, 15-22 m. The greatest variety of forms (29 spp.) was found in the littoral zone; the sublittoral had a spp.) was found in the littoral zone; the sublittoral had a maximum of 20 spp. and the profundal only 6. The average number of animals in the littoral was 8000 per sq. m., with a live weight of 200 g.; the number in the sublittoral was 7700 per sq. m., weighing 5360 g. and in the profundal 5000 per sq. m., with a live weight of 46 g. The unusually large weight of bottom animals in the sublittoral zone was due to the presence of large numbers of Dreissensia; the other animals constituted less than 1% of the sensia; the other animals constituted less than 1% of the total weight in this zone.—C. Juday.
16275. WRIGHT, STILLMAN. Chemical conditions in

some waters of Northeast Brazil. Ann. Acad. Brazil. Sci. 9(4): 277-306. 3 pl. 1937(rec'd 6-10-39).—The 4 localities studied are artificial lakes (acudes), near Campina Grande, Parahyba. The area lies on the boundary of the dry zone of N. E. Brazil and has marked diurnal temp. variations, seldom less than 7°C or more than 13°C; seasonal variations are less well marked. The rainfall is variable from year to year, averaging 798 mm. per annum; most of this falls in March, April and May, though April may constitute a dry break in the rainy season. The 4 lakes are rich in chloride and carbonate, and the conc. of these substances shows a seasonal cycle, being highest at the end of the dry season and falling during the rains. The details of the cycle depend on the local details of rainfall distribution. Acude Simao may receive chloride and carbonate through submerged springs. In Açude Bodocongo and Açude Vehlo chloride

decreased relative to carbonate during 1934-5. The pH of the waters lies between 7.25 and 8.9, and fluctuates with the free CO₂; it is in general lowest after the rains and rises rapidly if the algal flora is rich. Thermal stratification is intermittent and best developed between Feb. and May, when temperature differences of 1.7-4°C permit a well marked chemical stratification of pH and free CO₂. O₂ determinations proved unreliable, but suggest that the hypolimnia of the localities at times of stratification rapidly lose most of their oxygen content.—G. E. Hutchinson.

WILDLIFE MANAGEMENT-AQUATIC (See also the section "Pisces"; and Entries 16271, 16466, 18043)

16276. ALDRICH, A. D. Results of seven years' intensive stocking of Spavinaw Lake, an impounded reservoir. Trans. Amer. Fish. Soc. 68: 221-226. 1938(1939).—Spavinaw Lake is an artificial reservoir 1,800 acres in area from which the City of Tulsa, Okla., draws its water supply. Fishing and boating are permitted under strict supervision. Such use of the reservoir does not apparently affect the Bacillus colicontent of the water. Tulsa maintains a hatchery for stocking the lake with pan fish, principally black bass. An average of 195 bass per acre of lake area has been planted annually for the past 7 years. The catch by anglers has not increased materially during that time. Factors believed responsible are the increase in the population of large bass and their ability to evade capture. Expts. and observations conducted at the hatchery with adult bass demonstrate the ability of bass to acquire a keen sense of self preservation.-A. D. Aldrich.

16277. CAHN, ALVIN R. Progress report of the fisheries investigations of the Tennessee Valley Authority. Trans. Amer. Fish. Soc. 68: 61-65. 1 fig. 1938(1939).—The fisheries investigations are being carried out on all reservoirs as a cooperative undertaking between the Bureau of Fisheries, the Valley States Conservation Commissions (Alabama and Tennessee) and the Authority. A laboratory boat on Norris and another on the northern Alabama and middle Tennessee reservoirs are gathering basic facts on the metamorphosis of a river system into impounded waters. Biochemical, biophysical and biological data are accumulating which will throw considerable light on what is going on in impounded waters. The development of a bottom fauna, the plankton organisms, the food and growth rate of the fishes, parasites, movements, are all being studied. Brush shelters are being constructed, and creel censuses undertaken. The objective is to rehabilitate the impounded waters upon a scientific and economic basis.—A. R. Cahn.

16278. GUTERMUTH, C. R. Club-operated fish hatcheries—A part of Indiana's statewide plan. Trans. Amer. Fish. Soc. 68: 118-123. 1938(1939).—Public apathy toward conservation can be eliminated through education and experience. The general public is interested and will help as evidenced by the activities of Indiana's 812 conservation clubs. Hoosier clubs lead in club fish propagation; this year 182 clubs operated 434 club fish hatchery ponds with an aggregate of 264½ acres of water as a part of the state's efforts to increase the fish and game population. Indiana's statewide conservation club organization, made up largely of rural clubs, has completed its 5th year of successful operation and this plan has been so successful that it was used as a model by the National Wildlife Federation.—C. R.

16279. HESS, A. D., and J. H. RAINWATER. A method for measuring the food preference of trout. *Copeia* 1939(3): 154-157. 1939.—Soft-bodied insects were digested and passed through the alimentary tract of Salvelinus fontinalis much more rapidly than heavily chitinized forms. A method is presented whereby this factor can be taken into consideration in determining the relative numbers of different kinds of food organisms eaten by trout. The relative preference for different kinds of food organisms is then taken as the ratio of the relative numbers eaten to the relative numbers available.—Authors.

16280. MOULT, FRANK H. Laboratory apparatus for the rearing of young salmon from freshly fertilized eggs. Cons. Perm. Internat. Explor. Mer Jour. Conseil 14(2): 271-273. 1939.—Water passes through perforated zinc tray

holding the eggs. For 4 months the mortality among 2,000 specimens was 0.5%—F. H. Moult.

16281. PRÉVOST, GUSTAVE, and LUCIEN PICHÉ. Observations on the respiration of trout fingerlings and a new method of transporting speckled trout (Salvelinus fontinalis). Trans. Amer. Fish. Soc. 68: 344-353. 6 fig. 1938 (1939).—In view of the necessity of securing a method for the most economical transportation of trout, conditions permitting the accommodation of considerable numbers of fingerlings in small volumes of water, have been determined. A uniform distribution of the fish in the tank is obtained through their vertical separation into groups by the use of perforated metallic shelves; this arrangement prevents the huddling of the fish at the bottom of the tank, and their consequent exhaustion through the continuous struggle they exhibit when this crowding occurs. It insures, at the same time, a rapid and constant diffusion of the oxygen which is supplied at the bottom of the tank by highly efficient diffusers. Fingerlings, the volume of which exceeded 50% of that of the water used, were thus comfortably accommodated for periods of 3-4 hrs. Equipment for transportation of trout by plane and a method of planting fish

from the air are descr.—Authors.

16282. SCHMIDT, P. J., and G. P. PLATONOV. The seasonal character of the response of fish to low temperatures. Compt. Rend. (Doklady) Acad. Sci. URSS 19(3): 177-180. 1938.—When sturgeon were placed in a state of problems of the state of the seasonal character of the response of fish to low temperatures. anabiosis (produced by low temp.) in autumn, they revived; but they did not revive when cooled in summer. The significance of this fact in connection with studies in anabiosis

as well as in pisciculture is discussed.—O. Raber

16283. SMITH, E. V., and H. S. SWINGLE. The relationship between plankton production and fish production in ponds. Trans. Amer. Fish. Soc. 68: 309-315. 1938(1939).—Fifteen small excavated ponds were stocked with bluegill bream, fingerlings or fry (Helioperca macrochira) in the spring, 1936. 12 ponds were fertilized with inorganic fertilizers and 3 were controls. Quantitative plankton determinations were made at regular intervals throughout the season. The ponds were drained in the fall, 1936, and the fish were counted and weighed. The unfertilized controls produced 100 lbs. of fish per acre and the fertilized ponds produced up to 588 lbs. per acre. An almost direct relationship between plankton production and fish production was found.—E. V. Smith.

16284. SWINGLE, H. S., and E. V. SMITH. Fertilizers 16284. SWINGLE, H. S., and E. V. SMITH. Fertilizers for increasing the natural food for fish in ponds. Trans. Amer. Fish. Soc. 68: 126-134. 1938(1939).—Expts. using commercial fertilizer in distilled water indicated that an N-P-K-CaCO₂ ratio of 4:1:1:8 gave most economical plankton production. Pond waters in central Alabama require the addition of N, P, K, and Ca for maximum fish and plankton production. For use in pond waters, the above ratio was used with the amount of P doubled, giving a 4:2:1:8 ratio of N-P-K-CaCO₂. The application of this mixture of commercial fertilizers gave a fish production mixture of commercial fertilizers gave a fish production of 578 pounds per acre, compared to 134 lbs. per acre in the unfertilized control. The amts. of commercial fertilizers used at present per acre per application are: 40 lbs. of (NH₄)₂SO₄,

of lbs. of superphosphate (16%), 5 lbs. of KCl, and 30 lbs. of basic slag (or 15 lbs. of CaCO₃).—H. S. Swingle.

16285. WILKINSON, JAMES T. Notes on the use of supplements for fresh meat in the propagation of brook, rainbow and brown trout in Michigan. Trans. Amer. Fish. Soc. 68: 96-115. 6 fig. 1938(1939).—Brook (Salvelinus f. fontinalis), rainbow (Salmo gairdnerii irideus), and brown trout (Salmo trutta) fingerlings were fed diets in which fresh meats were supplemented with dry animal and plant meals. Ten diets were employed including one of pure sheep liver for comparison. Trout fed diets that contained dry meals were reared at a lower cost per pound of trout (except in one case among the rainbow trout) than the controls. Mortality among the trout that received sheep liver plus dry meals in the diet was generally about as low as (in some instances lower than) that of the controls; the loss among the trout that received trimmed pork "melts" (spleen from which fat has been trimmed) in the diet could in no case be compared favorably with the losses among the other trout. An epidemic of ulcer disease was most severe among the fish which were fed pork "melts."

Pure sheep liver yielded the greatest increase in weight among brook and rainbow trout. Among the brown trout 2 of the diets that contained dry meals produced better growth than did pure sheep liver. The best conversion of food ("as purchased" basis) into body tissue was obtained from some of the diets containing dry meals.—J. T. Wilkinson.

WILDLIFE MANAGEMENT—TERRESTRIAL

(See also in this issue Entry 17388)

16286. GRIMES, FRANK G. Abstract of fur laws, 1938-39. U. S. Dept. Agric. Bur. Biol. Surv. Wildlife Res. and Manag. Leaft. BS-118. 35p. 1938.—Discusses the bearing of the Federal Lacey Act upon interstate shipments of furs, and summarizes regulations as to open and closed seasons on fur animals, possession, sale, shipment, and export of skins, and licenses to trap in states and territories of the U. S. and in the Canadian provinces.—W. L. McAice.

and licenses to trap in states and territories of the U. S. and in the Canadian provinces.—W. L. McAtee.

16287. McATEE, W. L. Wildfowl food plants. Their value, propagation, and management. 141p. 17 pls., 4 figs. Collegiate Press Inc.: Ames, Iowa, 1939. Pr. \$1.50.—It is possible, by noting the feeding habits of wild ducks and by examining the contents of their stomachs, to identify the

plants upon which they feed. Plants belonging to 41 families have thus been recognized as wild-fowl food. The majority of these plants grow in swamps and in shallow water. Methods of transplanting and raising the plants are given and the optimum habitat of each is described.— C. Zirkle.

16288. SHELDON, H. P. History and significance of American wildlife: II. Trends from exploitation to restoration. U. S. Dept. Agric. Bur. Biol. Surv. Wildlife Res. and Manag. Leafl. BS-126. 7p. 1939.—A statement for educational use, commenting on the rapid exploitation of American natural resources, present day recognition of the need of conservation, planning wildlife restoration in the light of research, progress made in that direction and also in protective legislation, and restoration as a government function. —W. L. McAtee.

16289. ANONYMOUS. Two home-made traps for English sparrows. U. S. Dept. Agric. Bur. Biol. Surv. Wildlife Res. and Manag. Leafl. BS-121. 6p. 3 pl. 1938.—Brief references to introduction and spread of the species; discussion of its economic status and methods of controlling damage, including detailed description (and illustration) of nest-box traps; methods of operation.—W. L. McAtee.

PALEOBOTANY

EDWARD W. BERRY. Editor

17475. AXELROD, DANIEL I. A Pliocene flora from the Mount Eden beds, southern California. Carnegie Inst. Washington Publ. 476. 125-183. 6 pl., 1 fig. 1937(1938).—The Mount Eden flora, from the western end of the San Gorgonio Pass between the San Bernardino and San Jacinto Mts. in southern California, contains 30 spp. representing 21 genera and 16 families. The sediments which accumulated in shallow lakes surrounded by low mts. indicate an arid climate very similar to that existing there at the present time. Six floral associations are recognized: desert border, lake border, riparian, savanna, chaparral and coniferous. 26 of the spp. have modern equivalents in the vicinity at the present time. Although the flora has little in common with other Pliocene floras of western N. America, the associated vertebrate remains indicate Middle Pliocene age. Typical Miocene spp. are lacking. New spp. are described of Pinus (2), Pseudotsuga, Cupressus, Populus, Juglans, Quercus, Prunus (2), Prosopsis, Arctostaphylos, Ceanothus, Rhus, Sapindus, and Fraxinus. Prosopsis and an undetermined sp. of Lepidospartum are new to the fossil record. Ephedra sp. occurs in the desert border association.—C. A. Arnold.

17476. BERRY, EDWARD W. Fossil plants from the Cretaceous of Minnesota. Jour. Washington Acad. Sci. 29 (8): 331-336. 7 fig. 1939.—A fruit from the Dakota sandstone of Minnesota is descr. as Capsulocarpus dakotensis. It is also found at a similar horizon in Kansas and Nebraska. Protophyllocladus subintegrifolius, Sassafras acutilobum, and Laurus plutonia, are recorded from Minnesota.—E. W. Berry.

17477. BERRY, EDWARD W. A Meliosma in the Wilcox Eocene. Jour. Washington Acad. Sci. 29(9): 377-379. 2 fig. 1939.—M. cuneata (Viburnum cuneatum Newberry), from Montana, Tennessee, and Arkansas. A brief conspectus of the other fossil species of Meliosma is given.—E. W. Berry.

17478. CHANEY, RALPH W. The Deschutes flora of eastern Oregon. Carnegie Inst. Washington Publ. 476. 185-216. 7 pl. 1938.—A small flora of 5 spp. is described from a highway cut 10 miles northwest of Madras, Oregon. The remains are preserved in a pyroclastic mudflow which apparently accumulated on the slopes close to the volcano. The spp. indicate a more arid environment than was prevalent throughout most of the Miocene, and Lower or Middle Pliocene is postulated as the probable age of the flora. One new species of Prunus is described.—C. A. Arnold.

17479. CONDIT, CARLTON. The San Pablo flora of West Central California. Carnegie Inst. Washington Publ. 476. 219-268. 1938.—The flora was secured from 4 localities in the vicinity of Mount Diablo along the eastern edge of the Coast Ranges. 26 spp. belonging to 25 families and including new spp. in Smilax, Populus, Prunus and Ilex, are descr. The flora resembles that of the northern border of the present Taxodium forests of the south-eastern U. S. The indicated climate was only slightly warmer than that prevailing today but with heavier rainfall distributed throughout the entire year. The age is probably Upper Miocene.—C. A. Arnold.

17480. DORF, ERLING. A late tertiary flora from southwestern Idaho. Carnegie Inst. Washington Publ. 476. 73-124. 3 pl., 2 fig. 1936(1938).—The flora described contains 45 species collected in the vicinity of Weiser, Idaho. The plantbearing beds overlie the Columbia River basalt which in turn rests upon the shales of the Payette formation. They have been variously assigned to the Upper Payette, the Poison Creek and the Lower Idaho formations, and are believed to belong to the uppermost Miocene or lower Pliocene. The flora is typically temperate and most of the genera still exist in western North America. It is essentially similar to the Lithocarpus-Quercus-Arbutus association of the inner Coast Ranges of California. The climatic conditions inferred from the flora are mild temps., dry summers and an annual rainfall of 20-30 inches. This is in contrast to the more humid climates indicated by the earlier Miocene floras of the same general region. One new species each of Trapa and Fraxinus are described.—C. A. Arnold.

17481. HARRIS, THOMAS MAXWELL. British Purbeck Charophyta. ix+83p. 17 pl., 16 fig. British Museum (Natural

History): London, 1939. Pr. 7s. 6d.—The Upper Jurassic (Purbeckian) rocks of south Dorset (England) have long been known as being rich in fossil Charophytes. Clement Reid, in conjunction with James Groves, made extensive collections in this region between 1913 and 1916, and made numerous preparations of the collected material. They published a joint preliminary paper in anticipation of an extended account of these Charophytes but following Reid's death in 1916 nothing further was done by the surviving author. The entire collection was turned over to Harris for study after it was bequeathed to the British Museum by Groves in 1933. This contained abundant vegetative and reproductive material of each of the species present, Two of the genera, Clavator Reid and Groves and PERIMNESTE are placed in a new family, the CLAVATORACEAE. The chief differences between this and the Characeae, the only previously recognized family among the Charophyta, are alternate arrangement of leaves and branches, and the caldification of both outer and inner walls of the spiral cells of Groves, C. grovesi and C. bradleyi) were found in the Purbleckian deposits. The vegetative structure and \mathcal{C} reprobeckian deposits. ductive organs of each are described and are profusely illustrated by photomicrographs, camera lucida drawings, and diagrams. There is but one species (horrida) of the new genus PERIMNESTE. The most striking feature of this genus is the cluster of "antheridia" about each "oögonium." The single representative of the Characeae found in the collections was wholly vegetative. The new form-genus name CHARAXIS is proposed for Chara-like known only in the vegetative condition because the previously used name for them (Characeites) is untenable. The Characis of the Purbeck deposits is considered a new species, C. durlstonense. The paper concludes with a brief account of a new filamentous alga (Algacites clavatoris) growing on stems and other parts of Clavator.—G. M. Smith.

17482. MORELLET, LUCIEN, and JEAN MORELLET. Tertiary siphoneous algae in the W. K. PARKER collection. With descriptions of some Eocene Siphoneae from England. ix+55p. 6 pl., 7 fig. British Museum (Natural History): London, 1939. Pr. 5s.—The first-described species of fossil calcareous green algae (belonging to the families Codiaceae and Dasycladaceae) were considered animals and variously placed among the corals, bryozoa, and foraminifera. The source material from which Parker and Jones (1860) and Carpenter (1862) described calcareous green algae as foraminifera is preserved in the W. K. Parker collection of slides in possession of the British Museum. This monograph of the Morellets is, in the main, a re-examination of the original Parker and Jones slides to elucidate the obscurities resulting from their inadequate and misleading descriptions. The authors begin with a discussion of the general characteristics of the Codiaceae and Dasycladaceae, both living and fossil. This is followed by a list of these algae known from tertiary deposits in the Paris basin. The Parker and Jones material is then analyzed slide by slide. In almost all cases the specific determinations of Parker and Jones are considered incorrect. Several previously undescribed species were also found in these slides. They include two un-named species in the section Vaginopora of Neomeris, Neomeris alternana, Cymopolia edwardsi, Acicularia marginata, and several species of Acicularia not given a specific name. The 3d section of the monograph is a critical determination of the calcareous algae figured in plates 10-12 of Carpenter's Introduction to the study of the Foraminifera (1862). This is followed by a list of French Eccene Siphonae found on slides of the Geological Department of the British Museum. The monograph concludes with a discussion of siphonaceous algae of the Eocene of England in which Ovulites margaritula had been the only previously recorded species. The authors recognize 10 species, 3 of which are also found on the continent.—G. M. Smith.

17483. WOŁOSZYŃSKA, JADWIGA. Pleistoczne Charen von Roztoki bei Jaslo. [In Pol. with Ger. summ.] Acta Soc.

Bot. Polon. 15(2): 157-198. 4 pl. 1938.—Calcareous and calcareous-peaty postglacial deposits at Roztoki near Jaslo were rich in the oogonia of Chara. All of the 2000 oogonia examined were found to be in this genus. The following forms and variety were described as new: C. ceratophylla f. aurea, C. hispida f. pleistocenica, C. foetida f. rostocensis, and C. tenuispina var. rostocensis, C. fragilis, C. f. var. hedwigii and C. contraria were also found. The species studied were probably not all contemporary but the occurrence together may have been due to varying levels and chemical nature of the water. C. foetida f. rostocensis, C. contraria and probably C. tenuispina var. rostocensis seem to have lived principally in peaty shallow water.—F. A.

FUNGI

Editor: C. L. SHEAR. Associate Editor: EDITH K. CASH

(See also in this issue Entries 16151, 16168, 16179, 17397, 17405, 17407, 17431, 17435, 17654, 17673, 17675, 17685, 17704, 17754, 17755, 17759, 17760, 17812, 17820, 17846, 17849, 17850)

17484. BERDAN, HELEN. Two new genera of operculate chytrids. Amer. Jour. Bot. 26(7): 459-463. 2 fig. 1939.—CATENOCHYTRIDIUM, is proposed for a chytrid with a catenulate, compound hypophysis and the endoexogenous method of growth, and SEPTOCHYTRIUM, a polycentric chytrid having a coarse rhizomycelium, with constrictions, septations, and intercalary swellings. The type species, C. carolinianum* and S. variabile, occurred saprophytically in leaves of grass in Chapel Hill, N. Carolina, in conjunction with five other chytrids. They were isolated in "unifungal" state and cultured for at least a year under as nearly sterile conditions as possible—H. Berdan. conditions as possible.—H. Berdan.

17485. BETTS, EDWIN M., and SAMUEL L. MEYER. Heterothallism and segregation of sexes in Ascobolus geophilus. Amer. Jour. Bot. 26(8): 617-619. 1 fig. 1939.—A. geophilus is heterothallic. Ascocarps do not develop from monospore cultures but may be produced by crossing mycelia. from spores of opposite strains. The mycelia are produced by germinating single spores on soil decoction agar. Crossing of mycelia from spores of opposite strains in single asci shows that 4 spores in an ascus are of plus (minus) strain and 4 spores are of minus (plus) strain. The results indicate that sex factors may be segregated at either the 1st or 2d division of the zygote nucleus.—E. M. Betts.

17486. BOSE, S. R. The occurrence of a dense mass of thick-walled fringe-hyphae covering the hymenium of Daedalla flavida Lev. Ann. Mycologici 36(2/3): 154-155. 3 fig. 1938.—The larger pores are always lined with a fringe of dead and thick-walled tramal hyphae. When the basidia are numerous during rapid spore discharge the fringe sinks down and disappears but when the basidia decrease the fringe reappears. The character is constant for Daedalla but has not been found in Hexagonia, Lenzites, and Trametes

lactinea.—L. Dosdall.
17487. CIFERRI, R. Mycoflora domingensis exsiccata.
Ann. Mycologici 36(2/3): 198-245. 1938.—Descriptions are Ann. Mycologici 36(2/3): 198-245. 1938.—Descriptions are given for the fungi distributed in Century III, No. 201-300, including 124 spp., vars. or forms on 116 hosts. Two new genera are described: CHRYSACHNE (Tuberculariaceae-Mucedineae) and PANTOSPORA (Dematiaceae-Macrosporieae-Macronemeae); 32 new spp. in Asterina (2 spp.), Cercoseptoria, Cercospora, Fusoma, Haplaria, Helminthosporium, Meliola (22 spp.), Monacrosporium, Septoria; 4 new vars. in Meliola; 2 new forms in Oidium and Rhizocomia; 3 new combons in Meliola Poluthringium and tonia; 3 new combns. in Meliola, Polythrincium and Sphaceloma (S. citri (Butl.) on Citrus aurantium). From a study of 150 spp. of Meliola on more than 300 hosts the author concludes that the sub-division of this genus proposed by Stevens is not justifiable. A key to the subgenera is given on p.203 (Eumeliola, Chaetomeliola, Irene, Irenopsis, Irenina).—L. Dosdall.

17488, HASKINS, R. H. Cellulose as a substratum for saprophytic chytrids. Amer. Jour. Bot. 26(8): 635-639. 14 fig. 1939.—Rhizophlyctis petersenii (?), Nowakowskiella sp., N. elegans, Diplophlyctis sp., Septochytrium variabile, Catenochytridium carolinianum, Cladochytrium replicatum, and 3 undetd. forms were grown since January, 1939, using lens paper and cellophane as substrata. All produced mature thalli in great numbers and zoospores which caused reinfection of new material. Six spp. developed resting spores. Germination of the resting spores was observed in 3 spp. The cultures were kept under as nearly sterile conditions as possible in a room of controlled temp. (60° F). A number

of them were obtained from growth of a single spore. The cultures remained clean longer and required less care than when other substrata were used. Young germination stages could be more easily observed .- R. H. Haskins.

17489. HOERL, RUTH A. A new species of Arthrobotryum. Madroño 5(2): 75-77. 2 fig. 1939.—A. spongiosum, a fungus parasitic on Libocedrus decurrens, Chamaecyparis lawsoniana and Pseudotsuga taxifolia, is described from Del

Norte County, California.—A. M. Carter.

17490. KARLING, J. S. A new fungus with anteriorly uniciliate zoospores: Hyphochytrium catenoides. Amer. Jour. Bot. 26(7): 512-519. 18 fig. 1939.—H. catenoides has been found as a weak parasite and saprophyte in trichomes and parenchyma cells of Zea mays and in cooked internodes of Chara and Nitella. It is characterized primarily by anteriorly uniciliate zoospores and a predominantly polycentric, non-rhizoidal, hypha-like thallus with terminal and intercalary swellings and zoosporangia connected by tubular isthmuses or hyphae of varying length. In sporogenesis the contents of the sporangia usually emerge through exit-tubes of variable length as a naked mass and undergo cleavage into zoospores on the outside without the formation of a hyaline vesicular membrane. Oftentimes, however, partial or complete cleavage may occur within the sporangia, and in such cases the zoospores may frequently swarm first within the sporangium, then emerge in succession, and swim directly away. No evidence of sexuality or resting spores has been found. The discovery of this species supports Zopf's and Valkanov's observations on Hyphochytrium and their demonstration of the existence of hypha-like fungi with anteriorly uniciliate zoospores. It is proposed that the family Hyphochytriaceae be restricted to fungi of this type. Another family, MYCELIOCHYTRIACEAE, is suggested for similar chytridiaceous fungi with posteriorly uniciliate zoo-spores. This latter family would include at present Coeno-myces, Megachytrium, and possibly Macrochytrium.—J. S. Karlina.

17491. LINDER, DAVID H. A new species of Elaphomyces from the Great Smoky Mountain National Park. Jour. Elisha Mitchell Sci. Soc. 55(1): 131-133, 1 fig. 1939.—

E. appalachiensis.

17492. LITSCHAUER, VIKTOR. Ein Beitrag zur Kenntnis der Basidiomyceten der Umgebung von Lunz am See in Niederdonau. Oesterreich. Bot. Zeitschr. 88(2): 104-147.6 fig. 1939.—An enumeration chiefly of parasitic and saprophytic lignicolous Basidiomycetes collected in Sept. 1930 in this district of the Austrian calcareous Alps (about 600 m. altitude), containing 269 spp. belonging to 56 genera, among which some spp. less known and probably new for the district. 6 new species (in Corticium, Peniophora, Tomentella, and Poria) are described.-M. Onno.

17493. LOHWAG, K. Verwachsungsversuche an Fruchtkörpern von Polyporaceen. II. Ann. Mycologici 37(3): 169-180. 7 fig. 1939.—A segment several cm. wide was cut from the margin of a pileus of Fomes pinicola, turned in such a way that the direction of growth of the hyphae would be exactly reversed, and grafted back on to the parent pileus. After one month the grafted piece had coalesced with the parent and grown out anteriorly from the cut surface to from a normally oriented fruiting surface. The cut surface from the margin of the pileus had greater regenerative power than that near the point of attachment. In the fusion zone the new hyphae first formed a tangled mat from which a radially growing zone soon developed. These hyphae

penetrated the adjoining tissue to a considerable distance. On the unprotected cut surface Ca oxalate formed abundantly and hindered hyphal growth. Coalescence of an antipolarly and dorsiventrically turned segment on a pileus of

Ganoderma lucidum was also observed.—L. Dosdall.
17494. SAVILE, D. B. O. Nuclear structure and behavior in species of the Uredinales. Amer. Jour. Bot. 26(8): 585-609. 106 fig. 1939.—Uromyces fabae, U. lespedezae-procumbentis, U. hyperici, Puccinia sorghi, P. malvacearum, P. hieracii, Melampsora bigelowii, and Tranzschelia fusca were studied cytologically. There are 2 distinct types of nucleus in the rusts: an unexpanded form is present in every part of the life-cycle where the nucleus must migrate through a of the ine-cycle where the nucleus must migrate through a narrow pore; in the transformation of the unexpanded nucleus into the expanded, a new nuclear sphere, the ectosphere, is formed about the original nuclear membrane chromatin passes through the original nuclear membrane. into the ectosphere, leaving the original nuclear sphere, or endosphere, devoid of it. The endosphere is the body commonly termed the nucleolus, but the use of this term is deprecated; the body is not homologous with the nucleolus of the higher plants. What may be a true nucleolus is sometimes seen within it. The expanded nucleus is found in the aeciospores, urediniospores and teliospores, and in their basal cells and spore mother-cells, which suggests a common origin for these spore forms. The nuclei of the mycelium frequently have some of their chromatin outside the endo-sphere, but it can readily retreat within this sphere; their division is like that of the unexpanded nuclei. Mitosis was followed in greater detail than before, with the aid of the Feulgen method, and a haploid chromosome count of 4 was established for several spp. The evidence gathered favored the view that the pycniospore nuclei enter through the ostiolar hyphae of the pycnium and that very few reach each primordium. Preservation of the dikaryon condition by the operation of two opposed, balancing forces is in-dicated by the observation that in prophase the conjugate nuclei in the aecium tend to appear as mirror images of each other.—D. B. O. Savile.

17495. SMITH, DONALD J., and C. O. SMITH. The use of special media for sporulation of fungi. Phytopath. 29(9): 821. 1939.—Leaf juice of *Platanus racemosa* sterilized by passage through Chamberland filters has been used successfully in producing abundant spermatia and conidial sporulation of leaf spot fungi (Stigmella platani-racemosae, Stigmina platani, Mycosphaerella platanifolia and M. stigmina-

mina platani). This natural medium may be favorable for the development of perfect stages.—C. O. Smith.

17496. SWOBODA, FRANZ. Zur Anatomie der Lycoperdaceen. I. Lycoperdon marginatum Vitt. Ann. Mycologici 36(2/3): 95-118. 7 fig. 1938.—This species is characterized by a densely warty to spiny exoperidium which at maturity breaks into scales that fall away exposing a minute brown furfurescence on the endoperidium. The fungus is widespread. 7 synonyms are listed. Herbarium material in varispread. Y synonyms are inseed. Herbartum inaterial in various stages of development from central Europe and S. America was used in these studies. Free-hand sections were stained with lactic acid aniline blue. The object was to find the anatomical and histological features responsible for the characteristic structure of the peridium. In early stages the pseudoparenchymatous exoperidium is differentiated into 2 not sharply defined layers; a thin basal layer made up of closely appressed tangentially elongated thinwalled cells, and a thick rough layer of more isodiametrical polyhedral elements which are rounded outwardly producing a radial chain-like arrangement. In the mature basidiocarp the pseudo-parenchyma is uniform in structure. periphery the rapidly growing chains of cells take on a hyphal character forming a delicate down on the surface of the exoperidium. At the edge of the endoperidium just inside the basal layer of the exoperidium large irregularly shaped cells are formed which increase materially in size and in so doing form a cleavage zone between the 2 peridia. These cells clearly arise from the hyphae of the endoperidium furnishing evidence for the tramal nature of the latter and the hymenial character of the inner layer of the exoperidium. The apical opening of the endoperidium is developed from a localized cleavage tissue formed from the hyphae of the endoperidium by the development of abundant septa and unequal swelling of the segments formed. The histological basis for the splitting of the exoperidium

is found at first in the radial chain-like structure of the outer zone of the pseudoparenchyma. The forces involved are regarded as the contraction of the tissue caused by progressive water loss and the tangential tension resulting from increase in size of the basidiocarp. As this pseudoparenchyma takes on a more uniform structure the condi-tions are right for the breaking up of the exoperidium and the deepest splitting usually takes place where structural irregularities are found. As a consequence of the force exerted on the exoperidium by the increase in volume of the vesiculose cells it becomes loosened from the inner parts of the basidiocarp and breaks into scales. The delicate furfurescence on the endoperidium after the sloughing of the exoperidium consists of these dry, red brown vesiculose cells of the cleavage zone.—L. Dosdall.

17497. SWOBODA, FRANZ. Studien zur Gattung Lac-

tarius Fr. I. Lactarius zonarius Bull. ex Fr. und Lactarius flexuosus Pers. ex Fr. Ann. Mycologici 36(2/3): 119-127. 1938.—The author considers L. zonarius Bull. ex Fr., L. insulsus Fr. and L. flexuosus Pers. ex Fr. as distinct and well defined spp. although they have been cited as synonyms by French authors. A careful analysis of the literature regarding the 3 spp. is given and from a study of his own collec-

tions they are redescribed.-L. Dosdall.

17498. SYDOW, H. Novae fungorum species. XXVI. Ann. Mycologici 36(2/3): 156-197. 1938.—New species of fungi from Africa are described in the following genera:
Puccina, Ravenelia, Cerotelium, Aecidium, Phyllachora (3
spp.), Endodothella, Balladynopsis, Englerula (2), Asterina
(20), Lembosia (2), Clypeolella, Dictyopeltis, Diachorella,
Englerulaster.—L. Dosdall.

17499. SYDOW, H. Beschreibungen meuer südafri-kanischer Pilze. VII. Ann. Mycologici 37(3): 181-196. 1939. New spp. of fungi are described in the following genera: Mycosphaerella, Pseudothyridaria, Diatrype, Diatrypella, Eutypella, Stagonospora, Cryptodidymosphaeria.—L. Dos-

17500. SYDOW, H. Novae fungorum species. XXVII. 17500. SYDOW, H. Novae fungorum species. XXVII, Ann. Mycologici 37(3): 197-253. 1939.—The following new genera of fungi are established with one species each: ANGIOTHECA (Myriangiales): CRYPTOGENE, CRYPTOGENELLA, ENERTHIDIUM, HYPOCLINE, OOTHYRIUM, MASSARIOTHEA (Sphaeropsidales). The material on which the latter is based was collected in the Philippines, which the latter is based was conected in the Philippines, the remainder in various parts of Africa. New spp. are described from Africa in the following genera: Hemileia, Aecidium, Ustilago, Sphacelotheca, Tolyposporium, Balladyna, Balladynella, Dimerium, Acanthostoma, Nematostigma, Mycosphaerella, Glomerella, Phyllochora, Nectra, Calonectria, Balansia, Asterina, Lembosta, Leptodothiorella, Physichese Philippines Phaeofabraea, Didymopsis, Cladosporium; from the Philippines in Puccinia and Phyllostictina; from Japan in Coniothyrium; from Persia in Ustilago; from the East Indies in Puccinia.—L. Dosdall. 17501. WINGE, Ö., and O. LAUSTSEN. Saccharomy-

codes ludwigii Hansen, a balanced heterozygote. Compt. Rend. Trav. Lab. Carlsberg [Copenhagen] Sér. Physiol. 22(22): 357-370. 6 pl., 8 fig. 1939.—By cultivation of single spores of S. ludwigii isolated by micromanipulator it is shown that this yeast is a balanced double-heterozygote, which involves heterothallism in the haplophase. The ascospores are arranged in pairs, often coherent. Normally each pair in germination form a diploid zygote from which the new generation develops. When isolated spores are cultivated separately, each pair of spores contains one spore which germinates with haploid, normal, and unlimited. growth, whereas its partner germinates with a short hypha-like growth that stops early, after which the cells die. The normally germinating spores of an ascus develop either haploid colonies with long cells or haploid colonies with short cells. None of these can diploidize and none of them are therefore able to form spores. The 2 normally germinating spores of an ascus, one from each pair, either form both colonies with long cells or they both form colonies with short cells. A spore containing the gene N germinates with normal growth. A spore containing the gene n germinates with hypha-like growth, which stops early. A spore containing the gene L (together with N) gives long-cell colonies. A spore with the gene l (and N) gives short-cell colonies. N and L are inherited independently. S. ludwigii has normally the doubly heterozygous formula

NnLl. Hence, half of the asci at the reduction division get 2 pairs of spores of the formula (NL+nl), the other half of the asci get 2 pairs of spores of the formula (Nl+nL). In both types of asci the 2 spores containing the gene n germinate with hypha-like, early stopping growth. In the former type the 2 normally germinating spores form long-cell colonies (NL). In the latter the 2 normally germinating spores form short-cell colonies (Nl). The giant colonies of the long-celled type and of the short-celled type are characteristically different. During the studies a mutation $n \to N$ was observed which gave rise to a type of S. ludwigii of the formula NNLl. This type differs from the original in that all 4 ascospores germinate with normal growth when isolated, 2 producing long-cell (NL) and 2 short-cell (Nl) colonies; the hypha-like type with early stopping growth was absent. The genetical observations show that the 2d meiotic division in the ascus takes place with the spindle parallel to the longitudinal axis of the ascus; this view is also strengthened by our cytological observations. It is in contradiction to Guilliermond's statement.—From auth. summ.

17502. YARWOOD, C. E. Attempts at the in vitro culture of Erysiphe polygoni and Peronospora destructor. *Phytopath.* 29(9): 828-829. 1939.—Abstract.

LICHENES

17503. ERICHSEN, C. F. E. Neue Beiträge (3) zur Kenntnis der Flechtenflora Schleswig-Holsteins und des

Gebiets der Unterelbe. Ann. Mycologici 36(2/3): 128-153. 1938.—103 spp. of lichens and 6 spp. of lichen parasites are reported from the region. New vars. and forms are described in the following genera: Opegrapha, Lecidea, Catillaria, Biatorella, Lecanora, Parmelia, Caloplaca, Verrucaria, Graphis, Buellia.—L. Dosdall.

17504. LYNGE, B. Lichens from the West and North coasts of Spitsbergen and the North-East land collected by numerous expeditions. I. The macrolichens. Skrift. Norske Vidensk.-Akad. Oslo Matem.-Naturvidenskap. Kl. 1938(6): 1-136. 14 pl., 2 fig. 1938.—An enumeration of 141 spp. of lichens with detailed distribution maps, localities, and critical notes. The history of exploration is carefully covered. New spp. and vars. described: Dermatocarpon spitsbergense, Stereocaulon arcticum, Parmelia stygia var. septentrionalis. The flora is closely related to that of Scandinavia. A general discussion of results, and an index, are given.—J. Hedrick.

17505. SULMA, TADEUSZ. Über die Verbreitung einiger ozeanischer und anderer Flechten in Polen und Rumänien. Acta Soc. Bot. Polon. 15(2): 205-226. 4 pl. 1938.—Notes on the geographic and altitudinal distribution and the habitats of the following lichens in Poland and Rumania:—Alectoria bicolor, Sticta fuliginosa, S. silvatica, Normandina pulchella, Lobaria amplissima, L. verrucosa, Parmelia crinita, P. trichotera, Cetraria laueri, C. oakesiana, Evernia thamnodes, and Anaptychia speciosa.—F. A. Gilbert.

PTERIDOPHYTA

C. A. WEATHERBY, Editor

(See also B. A. 13(8): Entries 13784; (9): 15430; and in this issue 17552, 17561, 17562, 17699)

17506. COKER, W. C. A filmy fern from North Carolina. Jour. Elisha Mitchell Sci. Soc. 54(2): 349-350. 1 pl., 2 fig. 1938.—Reports the finding of Trichomanes boschianum in N. Carolina.—A. Holland.

17507. PFEIFFER, NORMA E. A new variety of Isoetes virginica. Bull. Torrey Bot. Club 66(6): 411-413. 1 fig. 1939.—Variety piedmontana*, from shallow soil about granite outcrops in Georgia.—N. E. Pfeiffer.

17508. TAGAWA, M. Ophioglossum Kawamurae Tagawa, a new species from Japan. Acta Phytotax. et Geobot. 8 (2): 134-136. 1 fig. 1939.—Described in Latin with notes in Japanese.—E. H. Walker.

17509. TAYLOR, MARY S. Filmy ferns in South Carolina. Jour. Elisha Mitchell Sci. Soc. 54(2): 345-348. 1 pl. 1938.—Reports the finding of Hymenophyllum tun-

bridgense and Trichomanes petersii in S. Carolina.—A. Holland.

17510. TONGIORGI, EZIO. Sulla sessualità della Salvinia natans All. [Reproduction in Salvinia natans.] Nuovo Gior. Bot. Ital. 45(1): LXVII-LXX. 1938(1939).— Extended study in the field and in herbaria shows 3 forms of this species: (a) pleiomicrosporocarpic (the usual type described by authors) having a preponderance of microsporocarps; (b) pleiomacrosporocarpic with more macrosporocarps and better vegetative growth; (c) monomacrosporocarpic, entirely macrosporocarpic and of luxuriant vegetative growth, much branched, the leaves larger and brighter green even in dried specimens. These differences are presumably related to polyploidy, the chromosome number having been variously reported as 4, 8, 15 (16?), 12, and 24.—F. Ramaley.

SPERMATOPHYTA

FRANCIS W. PENNELL, Editor

(See also in this issue Entries 16132, 16144, 16149, 16157, 16158, 16181, 16183, 16190, 16252, 16266, 16268, 17475, 17479, 17480, 17658)

GYMNOSPERMAE

17511. BUCHHOLZ, J. T. The generic segregation of the Sequoias. Amer. Jour. Bot. 26(7): 535-538. 1939.— This paper divides Sequoia into two genera, describing SEQUIOADENDRON, which includes the Big Tree. The descriptions also include external taxonomic, histological, and embryological differences, both specific and generic, between Sequoiadendron giganteum comb. nov. and Sequoia semperivens Endlicher, and includes the synonymy.—J. T. Buchholz.

17512. PICQUENARD, CH. Étude sur les Conifères. Bull. Soc. Sci. Bretagne 15(1/2): 17-33. 1938.—A general account of the botany, ecology, and economic value of various native and naturalized species in Brittany, with 12 references.—W. C. Tobie.

17513. STOCKWELL, W. PALMER. Cone variation in digger pine. Madroño 5(2): 72-73. 1 fig. 1939.—Cones of Pinus sabiniana vary in length from 3½ inches in a colony on Figueroa Mountain, Santa Barbara County, California, to 13 inches in a colony at Bartlett Springs, Lake County.

Audattorio ad (C

The large cones resemble those of P. coulteri; the small ones at the southern limit of distribution resemble those of P. torreyana.—A. M. Carter.

MONOCOTYLEDONES

17514. GLÜCK, HUGO. Über das Vorkommen caulomartiger Blütenstandshüllen bei Gramineen. Bot. Jahrb. 70(2): 233-247. 11 fig. 1939.—A discussion of the occurrence in certain grasses of inflorescence structures which are morphologically stems rather than leaves. Found in the genera Nephelochloa, Periballia, Setaria, Panicum, Pennisetum, Cenchrus, and Cynosurus.—H. N. Moldenke.

17515. SAXÉN, UNO. Die Varietäten von Carex salina Wg. ssp. suspidata Wg. nebst ihren Hybriden an den Küsten des Bottnischen Busens, Finnland. Acta Bot. Fennica 22/23. 1-30. 5 pl. 1938.—An historical review is given, together with a discussion of the occurrence of C. salina throughout the world (including N. America). Its known stations in Finland are listed. Description and discussion of all known subspecies, vars., and forms are

included. 12 newly discovered hybrids are described. 7 maps and a bibliography are included.—H. N. Moldenke.

17516. SCHMOLL, HAZEL M. A realignment of the Panicum thermale group. Madroño 5(3): 90-96. 1939.— Two spp. and 2 vars. from western North America are proposed as new in Panicum, section Lanuginosa. -A. M. Carter.

DICOTYLEDONES

17517. BENSON, LYMAN, and ANNETTA CARTER. Two new species of Ranunculus § Flammula. Amer. Jour. Bot. 26(7): 555-557. 1 fig. 1939.—R. oresterus Benson, from Oregon, and R. alveolatus Carter, from California. A key to the N. American species of § Flammula, growing north

of Mexico, is given.—L. Benson.

17518. BRETT, R. G. The description of a new Eucalypt species. Papers and Proc. Roy. Soc. Tasmania 1938: 129-130. 2 pl. 1939.—Eucalyptus morrisbyi, an almost extinct East Tasmania (Commonwealth of Australia), showing affinity with E. urnigera, E. cordata, and E. gunnii. It hybridizes with E. viminatis. It is of possible economic value as a windbreak on coastal sandy soils.—R. G. Brett.

17519. CONSTANCE, LINCOLN. The genus Pholistoma Lilja. Bull. Torrey Bot. Club 66(6): 341-352. 1 pl., 1 fig. 1939.—A taxonomic revision with descriptions, keys, a distributional map and illustrations of critical structures; 3 new combinations.—L. Constance.

17520. CONSTANCE, LINCOLN. The genera of the tribe Hydrophylleae of the Hydrophyllaceae. Madroño 5(1): 28-33. 1939.—Mainly on the basis of capsule and seeds characters, the entities usually placed in Nemophila and Ellisia fall into the genera Pholistoma, Ellisia, Nemo-

and Ellissa fall into the genera Pholistoma, Ellissa, Nemophila and Eucrypta, which, with the genus Hydrophyllum, make up the tribe Hydrophylleae.—A. M. Carter.

17521. EPLING, CARL. Two Mexican species of Hyptis. Madroño 5(1): 15-16. 1939.—Two species of Hyptis are proposed as new.—A. M. Carter.

17522. EPLING, CARL. A note on the occurrence of Salvia in the New World. Madroño 5(1): 34-37. 4 fig. 1939.

Chart showing the principal concentration areas of the —Chart showing the principal concentration areas of the Labiatae in the New World and the distribution of Salvia, subgenus Calosphace, sections Curtiflorae, Albolanatae, Tomentellae, Flocculosae, Micranthae, Tubiflorae, Purpureae, Rudes, Chariantha and Angulatae are included.-A. M. Carter

17523. EPLING, CARL. Notes on the Scutellariae of western North America. Madroño 5(2): 49-72. 1 pl., 2 fig. 1939.—This treatment of Scutellaria recognizes 11 species; 3 subspecies are described as new and 1 new combination

is proposed.—A. M. Carter.

17524. FOSBERG, F. R. Diospyros ferrea (Ebenaceae)
in Hawaii. Bernice P. Bishop Mus. Occas. Papers 15(10):
119-131. 1939.—Maba sandwicensis is made a subsp. of D. ferrea, and 5 forms are described; M. s. var. pubescens. Skottsberg is made a var. of ferrea, and 2 forms are described; 3 vars. and 4 forms of D. ferrea are also described. Key to all these; and discussion of relationship of Pacific spp. of Diospyros.—E. H. Bryan, Jr.

17525. GLEASON, H. A. A new Tibouchina from Peru. Amer. Jour. Bot. 26(8): 634. 1939.—T. incarum.

17526. GLEASON, H. A. Eight undescribed species of Melastomataceae. Bull. Torrey Bot. Club 66(6): 415-419. 1939.—Tibouchina cornuta (Peru), Conostegia hispida (Ecuador), C. multiflora (Ecuador), Miconia cayumbensis (Peru), M. cremadena (Costa Rica), Clidemia ecuadorensis (Pauson), C. receilines (Costa Rica), Clidemia ecuadorensis (Ecuador), C. gracilipes (Oaxaca, Mexico), Blakea mexiae (Peru).—H. A. Gleason.

17527. HEIMSCH, CHARLES Jr., and RALPH H. WETMORE. The significance of wood anatomy in the taxonomy of the Juglandaceae. Amer. Jour. Bot. 26(8): 651-660. 21 fig. 1939.—Manning has utilized evidence obtained from a study of the inflorescences found in the Juglandaceae for an interpretation of generic relationships within the family. The present investigation reports findings obtained from a valem studies which in the main confirm obtained from xylem studies which in the main confirm Manning's conclusions. There were available for this study microscopic slides from wood specimens representing the majority of the species of the family. The criteria employed were those now generally recognized as significant in

phylogenetic studies based on secondary xylem. The findings were as follows:—Alfaroa seems to be the most primitive genus of the family. Engelhardtia is somewhat more advanced. Pterocarya and Juglans are closely allied with many anatomical features in common, though Juglans has reached a somewhat higher degree of specialization. Carya has attained a level of structural organization not found in any other genus. The isolated genus Platycarya seems to have achieved a high degree of organization along an independent pattern of specialization. This genus Manning finds to have a generalized inflorescence for the family and suggests it as primitive; anatomical evidence does not support this belief. Intensive study of intrageneric variations in anatomy gives few facts to support the idea that the established criteria employed in phylogenetic investigations based on anatomy are adequately refined for intrageneric interpretations.—R. H. Wetmore.

17528. HENDERSON, L. F. A new thistle from Oregon. Madroño 5(3): 97-98. 1939.—One species of Cirsium is proposed as new A. M. Conter.

posed as new.—A. M. Carter. 17529. KITAMURA, SIRO. Achilleae Japonicae. Acta Phytotax. et Geobot. 8(2): 118-122. 1939.—A systematic treatment in Japanese with a key, recognizing 2 spp. and 7 subspp. and vars.—E. H. Walker.

subspp. and vars.—E. H. Walker.

17530. KITAMURA, SIRO. Les Picris du Japon. Acta
Phytotax. et Geobot. 8(2): 123-127. 1939.—A systematic
treatment in Japanese with a key recognizing 2 spp. and
8 subspp., including several transfers.—E. H. Walker.

17531. LARISEY, MARY MAXINE. Notes on some
middlewestern species of Baptisia. Amer. Jour. Bot. 26

(7): 538-539. 1939.—For many years B. minor, the blue-flowered species found on dry hills and prairies from Missouri and Kansas, SW to Texas has been confused with B. australis, a much more robust blue-flowered species. growing along river banks from Pennsylvania to southern Indiana, south to Virginia and Tennessee. Distinctions between the two species are pointed out, and a bibliographical treatment and description of B. minor is given. Attention is also called to a case of hybridism between B. minor is also called to a case of hybridism between B. minor and B. leucophaea in Missouri, Kansas and Oklahoma. A binomial, X b. bicolor Greenman & Larisey, hyb. nov., is proposed.—M. M. Larisey.

17532. McMINN, H. E. Notes on the genus Ceanothus in California. Madroño 5(1): 13-15. 1939.—One new var. and one new combination are proposed in the genus Ceanothus.—A. M. Carter.

17533. MARKLUND, GUNNAR. Die Taraxacum-Flora Estlands. Acta Bot. Fennica 22/23. 1-150. 25 maps, 40 fig. 1938.—The genus Taraxacum as it occurs in Estonia is

1938.—The genus Taraxacum as it occurs in Estonia is discussed; 146 spp. are recognized, 40 spp. are described as new. Synonymy is given, together with full citation of specimens not only from Estonia, but also from other countries in northern Europe. The genus is divided into 5 groups and the evolutionary relationships of the species in each group are discussed in detail. Eleven binomials are published as hyponyms.—H. N. Moldenke.

17534. MENDOZA, DEMETRIO R. Fruit and seed key of important Philippine leguminous trees. Philippine Jour. Forest. 2(2): 161-171. 2 pl. 1939.—This paper is the first of a series of keys being prepared by the Philippine Bureau of Forestry to serve as a guide for the identification of tree seeds. The key is based on mature, dry fruits and seeds of 35 spp.—W. N. Sparhawk.

17535. MORTON, C. V. A second United States species of Bernardia. Jour. Washington Acad. Sci. 29(9): 375-377. 1939.—B. myricifolia is restricted to Texas and New Mexico. The Arizona and California plants previously referred to this species are described as B. incana.—C. V. Morton.

17536. ROCKHAUSEN, M. Verwandtschaft und Glieder-ung der Compositen-Gattung Werneria. Bot. Jahrb. 70(2): 248-272. 1939.—Detailed discussion of the morphology of the S. American genus Werneria and the characters by which its species may be classified into 2 subgenera and 6 sections, are here proposed for the first time.—H. N. Moldenke.

17537. RUNYON, H. EVERETT. A new sandbur from western Oklahoma: Cenchrus albertsonii. Amer. Jour. Bot. 26(7): 485. 2 fig. 1939.—In May 1936, new growth was observed emerging from the base of perennial sandbur leasts. The old burs passisting was different from those plants. The old burs persisting were different from those

produced by the annual, Cenchrus pacuflorus, the only species of Cenchrus described as occurring in this locality. Some of these perennial plants were transferred to the nursery and periodically moved to the greenhouse during the winter. All plants including those remaining outside resumed growth and flowered. This plant is capable of withstanding moderate and dry winters. Its distribution is limited to Western Oklahoma, possibly extending into Texas and Kansas.—H. E. Runyon.

17538. SCHREIBER, BERYL O. The genus Helianthemum in California. Madroño 5(3): 81-85. 1 fig. 1939.—One species of Helianthemum is proposed as new.—A. M.

Carter.

17539. SHARSMITH, HELEN K. A new species of Cirsium from California. Madroño 5(3): 85-90. 1 fig. 1939.—Section Dermatolepis of Cirsium is amplified to include

1 new species.—A. M. Carter.
17540. SPOTTS, ALICE MARIAL. The violets of Colorado. Madroño 5(1): 16-27. 1939.—18 spp. and 4 vars. of Viola are considered as occurring in Colorado.—A. M.

Carter.

17541. WERDERMANN, E. Revision der ostafrikanischen Arten der Gattung Ceropegia. Bot. Jahrb. 70(2): 189-232. 7 pl., 5 fig. 1939.—A monographic study recognizing 53 spp., with a key provided for their identification. Twelve new spp. and 1 var. are proposed from Tanganyika Territory and 2 new spp. from Abyssinia.—H. N. Moldenke.

17542. WIESLANDER, A. E., and BERYL, O.

SCHREIBER. Notes on the genus Arctostaphylos. Madroño 5(1): 38-47. 2 pl., 2 fig. 1939.—Descriptions of 3 California spp. of Arctostaphylos are emended, 2 species are described as new, and 1 new combination is proposed. Characters of burls and nascent inflorescences are utilized as diagnostic.

- $m{A}$. $m{M}$. $m{C}$ arter.

17543. WILLIAMS, SIMON. Secondary vascular tissues of the oaks indigenous to the United States. I. The importance of secondary xylem in delimiting Erythrobalanus and Leucobalanus. Bull. Torrey Bot. Club 66(6): 353-365. 6 fig. 1939.—On the basis of an absolute correlation existing between leaf form and wood anatomy, new boundaries are proposed for Leucobalanus and Erythrobalanus in the genus Quercus, resulting in a change of position of 8 spp.—Q. emoryi, Q. dumosa, Q. virginiana, Q. arizonica, Q. oblongifolia, Q. reticulata, Q. engelmanni, and Q. douglasii—from the White Oak to the Red Oak group. Floral and fruit features are shown to be less valuable in determining natural affinities in Quercus than the anatomy of the secondary when equipment is a considered in account of the secondary. dary xylem, considered in conjunction with leaf form. The possible creation of a 3d subgenus, to include those spp. which exhibit composite features of the Red and White Oaks, is debated. 7 of the above species (Q. douglazii is the exception) have evergreen foliage, and together with the 7 species of evergreen oak previously classified in Erythrobalanus form a distinct unit within the Red Oak group. Though these species as a group possess many features considered as primitive for the genus, their anatomical features overlap those of the deciduous spp.; it is suggested that they be recognized as a distinct segregate within Erythrobalanus, for which the term "live oaks" is retained, and that this congeries be not accorded subgeneric rank until further evidence is presented.—S. Williams.

FLORISTICS AND PLANT DISTRIBUTION

17544. ABBAYES, H. des. Stations nouvelles de deux plantes intéressantes pour l'ouest de la France: Plantago carinata Schrad. et Lepidium virginicum L. Bull. Soc. Sci. Bretagne 15(1/2): 34-38. 1938.—The distribution of these 2 spp. in France (especially Brittany) is reviewed, with 12 references. A distribution map for P. c. in France is given, showing a new station near the mouth of the Loire.—W. C. Tobie.

Loire.—W. C. Tobie.

17545. BOŠNJAK, K. Prilog poznavanju Durmitorske vegetacije. [Contribution to the plant relations of the Durmitor Mountains in Montenegro.] [With Ger. summ.] Acta Bot. Inst. Bot. Univ. Zagreb. 10: 13-22. 1935.—Three zones are described and their characteristic plants mentioned: (1) subalpine, herbaceous growth, 1125-1600 m. (2) subalpine forest, 1500-1700 m. (3) treeless alpine region, 1700-2528 m. The presence of Pinus leucodermis was confirmed and 2 new stations found, but Picea omorika and Acer obtusatum were not found. Leontopodium alpinum, heretofore unreported in the region, was found at 2 stations. heretofore unreported in the region, was found at 2 stations. No rhododendrons were found and Vaccinium vitis idaea was seen only at Barnojezero, Gentiana bošnjakii was found in 1927.—H. H. Clum.

17546. CHOUARD, PIERRE. La première excursion

botanique interuniversitaire, organisée en Bretagne par l'Université de Rennes (4-7 Juin 1938). Bull. Soc. Sci. Bretagne 15(1/2): 81-104. 5 fig. 1938.—An account is given of wild and cultivated plants observed at various localities in Brittany. Ecological and economic aspects are discussed.

-W. C. Tobie.

17547. GUINIER, PH. Vallée de la Moselle entre Liverdun et Pompey. Compte rendu de l'excursion du 23 Avril 1939. Bull. Mens. Soc. Sci. Nancy 4(3/4): 60-63. 1939.—

Plants occurring at various sites are catalogued and discussed.—W. C. Tobie.

17548. LANGE, TH. Jämtlands kärlväxtsora. [The vascular plants of Jämtland [Sweden].] Acta Bot. Fennica 21.1-204. 125 maps. 1938.—This is an account of the vascular plants of province of Jämtland. plants occurring in the province of Jämtland, Sweden, and their distribution within this area. The study extended from 1926 to 1937 and consisted of explorations by the author to all parts of the province and the examination of the available specimens located in several herbaria. Several specialists have assisted in the determination of the more difficult groups. A total of 1523 plants has been considered. They consist of: 88 spp. of *Taraxacum*, 332 spp. of *Hieracium*; stationary spp. 756 of which 114 are naturalized exotics; casual spp. 198; hybrids 159. Climate, soils and the geological and physiographical features of the country are discussed. The province has been divided upon the basis of vegetation into three regions corresponding in general with certain quite distinct physiographical and geological regions as follows: Mountain ("Fjallområdet"), Silurian ("Silurområdet") and the Archaic ("Urbergsområdet"). Some of the elevations in the Mountain Region extend above the timberline. The predominant tree at high altitudes is birch (Betula pubescens Ehrh.) intermixed in varying proportions with spruce. The Silurian region is characterized by limestone soil and, therefore, supports many spp. not found in the other regions. Spruce is generally still dominant although in places supplanted by pine. The most striking feature of this region is the blending of many high altitude and southern spp. In the Archaic Region spruce and pine occur in about equal proportions. H. L. Blomquist.

17549. LÜDI, W. Die Gipfelflora des Flüela-Schwarzhorns bei Davos. Ber. geobot. Forschungsinst. Rübel Zürich 1938: 50-53. 1939.—A list of 49 plants found on a summit above

the snow limit.—K. Fægri.
17550. WIECZOREK, KAROL. Galium trifidum L., eine neue Art für die Flora von Polen. [In Pol. with Ger. summ.] Acta Soc. Bot. Polon. 15(2): 153-155. 1938.— Galium trifidum, an arctic species, is recorded for the first time in Poland.—F. A. Gilbert.

MORPHOLOGY AND ANATOMY OF VASCULAR PLANTS

ADRIANCE S. FOSTER, Editor

(See also in this issue Entries 16116, 16157, 16175, 16192, 17514, 17527, 17543, 17767)

17551. BERKLEY, EARL E. Cellulose orientation, strength and cell wall development of cotton fibres. Textile Res. [Boston] 9(10): 355-373. 3 fig. 1939.—X-ray diffraction patterns of fibers containing only the primary wall showed a tendency for preferred orientation of the b-axis of the

unit cell. This was confirmed by microscopic studies. As secondary fiber wall was formed the 002 ring of the diffraction pattern became dark throughout and as deposition of cellulose continued the region of greatest darkening shifted 90° from that of the primary wall. Random orientation of cellulose was not observed in any of the 6 series of samples studied involving 3 vars. The wax pattern was more prominent than the cellulose pattern during the stage when the cell contained only the primary wall. Secondary wall pattern changed gradually with cellulose deposition for the first few days after opening of flower and showed no change in orientation after 6th day. Tensile strength by Chandler bundles increased for 12 to 18 days after secondary wall thickening began, and reached maximum 3 to 4 weeks before bolls opened.—J. F. Wilson.

Chandler bundles increased for 12 to 18 days after secondary wall thickening began, and reached maximum 3 to 4 weeks before bolls opened.—J. F. Wilson.

17552. BLISS, MARY C. The tracheal elements in the ferns. Amer. Jour. Bot. 26(8): 620-624. 16 fig. 1939.—A detailed examination of the tracheal elements of representative types of the eusporangiate and the leptosporangiate ferns including 38 genera of 9 families. True vessels exist in Pteridium latiusculum and in P. esculentum. The tracheal elements of all the genera of ferns investigated with this exception are tracheids that are in general scalariform, but a tendency to serial and irregular pitting on the lateral walls is common. A condition that may be regarded as transitional between the tracheid and the vessel in the genus Pteridium is the presence of tracheal elements that taper to a point, as does the tracheid, and that have an extensive and clearly perforated area of contact between two contiguous elements.—M. C. Bliss.

17553. BOYES, J. W. Development of the embryo sac of Plumbagella micrantha. Amer. Jour. Bot. 26(7): 539-547. 51 fig. 1939—Three divisions are involved in the development of the tetrasporic embryo sac. 3 of the macrospore nuclei (resulting from the 2d meiotic division) migrate to the chalazal end of the embryo sac and unite. One macrospore nucleus remains at the micropylar end and divides at the same time as the newly formed chalazal complex. Of the 4 nuclei thus formed, one (with n chromosomes) becomes the nucleus of the egg; another (with 3 n chromosomes) becomes the nucleus of the single antipodal cell; and the remaining 2 nuclei (with n and 3 n chromosomes, respectively) unite to form a tetraploid primary endosperm nucleus. The development of anomalous 6-nucleate embryo sacs results if one of the 3 nuclei ordinarily migrating to the chalazal end remains behind and divides independently. The Plumbagella type is considered to have arisen as a modification of the Fritillaria type.—J. W. Boyes.

17554. CAVE, MARION S. Macrosporogenesis in Leucocoryne ixioides Lindl. Cytologia 9(4): 407-411. 1939.—
Leucocoryne is a genus in the tribe Allieae. Pollen-grain divisions show 9 haploid chromosomes similar to the configuration found in the 9-paired spp. of Allium and in Nothoscordum. Macrosporogenesis is similar to that in Allium and Nothoscordum. The macrospore mother cell divides, giving rise to 2 macrospores, the outer one of which degenerates. The other divides 3 times giving rise to 8 nuclei arranged in the "normal" way.—M. S. Cave.

17555. DANA B. F. Morphological and anatomical features of phyllody in varieties of tomato and bean. *Phytopath.* 29(9): 823. 1939.—Abstract.

17555. ESAU. KATHERINE. Development and structure of the phloem tissue. Bot. Rev. 5(7): 373-432. 27 fig. 1939.—A review of literature (122 papers) clarifying present concepts of phloem structure and considering certain historical aspects of the problem. The different kinds of phloem cells of all groups of plants known to have this tissue are described separately and in relation to each other, but the structure and development of the sieve tube are treated in particular detail. Considerable attention is paid to the development of terminology regarding the phloem cells and their parts.—K. Esau.

17557. FOSTER, ADRIANCE S. Problems of structure, growth and evolution in the shoot apex of seed plants. Bot. Rev. 5(8): 454-470. 1939.—A résumé is first given of the present status of the apical cell theory, the histogen theory and the tunica-corpus theory with reference to the terminal meristem of the shoot in spermatophytes. This is followed by a critical examination of the most recent investigations on the histogenesis of the shoot apex in gymnosperms and angiosperms. Need for a more realistic picture of terminal meristems is briefly discussed from both a physiological as well as a phylogenetic point of view. The review is concluded by a discussion of the

divergence in structure and growth of vegetative and floral apices in the angiosperms with particular emphasis upon the work of Grégoire.—A. S. Foster.

17558. MARVIN, JAMES W. Cell shape studies in the pith of Eupatorium purpureum. Amer. Jour. Bot. 26(7): 487-504. 4 pl. 1939.—Three-dimensional models of 100 Eupatorium pith cells were made by means of a new technique previously described. These cells had an average of 13.36 contacts, an average rather similar to that (13.97) found by Lewis for 250 undifferentiated cells. The average number of faces approaches the average for compressed lead spheres of uniform diameter (Marvin), but the averages for large and small cells tend to resemble those found by Matzke for large and small compressed lead spheres. Assemblages of polyhedra with trihedral angles only, yet averaging less than 14 faces, are possible through certain planes of division (Lewis). The average cell, oriented in vertical columns, presents an upper and a lower facet, with 11 or 12 lateral facets. Pentagonal faces are most common on the cells as on compressed lead shot. There is a correlation between the size of a face and the number of its edges; large faces have more edges than small ones. The areas observed are similar to the areas of the corresponding regular polygons with sides of unit length. The cells show an economy of surface to volume approaching, and in some cases equalling, that of an orthic tetrakaidecahedron or rhombic dodecahedron of equal volume.—J. W. Marvin.

17559. METCALFE, GEORGE. Observations on the anatomy of the cricket-bat willow (Salix caerulea Sm.). New Phytol. 38(2): 150-158. 3 fig. 1939.—This investigation is concerned principally with the relationship of the leaf trace to the diffuse-porous structure of the secondary wood, and with the anatomical relationship of a branch to the main stem which bears it. Studies have been carried out on 1- to 5-yr-old branches. The wood consists of fibers and vessels. Wood parenchyma forms a ring on the inner surface of each year's growth. The wood rays are uniseriate and heterogeneous. The vessels in the diffuse-porous secondary wood of young branches are the downward continuations of the vessels of leaf-trace bundles. In a branch crotch there is no continuity between the vessels of the branch and those of the part of the stem above the crotch.—J. R. King.

17560. SINNOTT, EDMUND W., and ROBERT BLOCH, Changes in intercellular relationships during the growth and differentiation of living plant tissues. Amer. Jour. Bot. 26(8): 625-634. 1939.—The problem of changing intercellular relationships brought about by growth and differentiation was studied in living tissues in the growing region of certain grass roots. Cellular readjustments observed in this material cannot be due to surface forces, since they appear relatively late after cellulose walls have been laid. appear relatively late, after cellulose walls have been laid down; nor due to differential cell division, since division ceases in all the cells of a given region at about the same time. They apparently are not due to "sliding" growth, since transverse walls in adjacent longitudinal rows do not approach or pass each other. Changes in intercellular relationships here observed result from different rates of growth in different parts of the cell wall. This is evident where a cell is in contact with two others of unequal growth rates; where the ends of a cell grow less rapidly than the middle portion; and where the "wave" of elongation, proceeding toward the root apex, affects one end of a cell before it does the other. Other more specialized cases of differential wall growth are briefly discussed, such as the more or less sharply localized intrusive growth of certain. idioblasts, cambium cells, and non-articulate latex ducts. Reported instances of sliding growth are reviewed; they may be explained by differential growth of the cell wall. The implications of these results for the general problem of development are discussed, and the importance of a more extensive knowledge of the structure and growth of the

cell wall is emphasized.—Auth. summ.

17561. STEIL, W. N. Apogamy, apospory, and parthenogenesis in the Pteridophytes. Bot. Rev. 5(8): 433-453. 1939.

—The following topics are treated in the paper: Terminology, occurrence of apogamy, apospory, and parthenogenesis in the plant kingdom with special reference to the Pteridophytes, the nature and the origin of the apogamous

embryo, the nature of the apogamous and the aposporous structures and growths, the cytology of apogamy, apospory, and parthenogenesis, and the relationship between apogamy

and apospory. An extensive review of the literature is also included in the paper.—W. N. Steil.

17562. TAYLOR, T. M. C. Some features of the organization of the sporophyte of Equisetum arvense L. New Phytol. 38(2): 159-166. 6 fig. 1939.—The cellular partitioning of the proembryo and the delimitation of the apical cell of the root are held to conform to the theoretical laws laid down by D'Arcy Thompson. In the development of the embryo, the adult organs are differentiated at the poles of the archegonial axis with the shoot at the apex and the root at the base. All bud initials are endogenous in origin and alternate with the leaves and parallel the developmental stages of the embryo. The shoot and root are held to be equivalent members. In view of certain features of its development, E. arvense is held to be the one most primitive of the Pteridophyta.—J. R. King.

17563. WULFF, HEINZ DIEDRICH. Die Pollenentwick-

lung der Juncaceen. Jahrb. wiss. Bot. 87(4): 533-556. 1939.

The beginning of a wall is laid down throughout the whole pollen mother cell after the heterotypic division; it is transitory, and no permanent cleavage follows. The four primary pollen grain nuclei are first "quatratically" arranged in the mother cell, then tetrahedrally so that 3 basal nuclei and an apical nucleus may be distinguished. During the prophase and metaphase of the division of these primary nuclei, cleavage of the substance of the mother cell occurs, the clefts appearing in the center and spreading to the periphery. This division separates the generative cell towards the centre of the dividing mother cell. Growth of the pollen mother cells and the deposition of an exine follow the division of the primary nuclei. The division of the generative cell occurs within the anther as soon as the tetrads have reached their full size. In the Cyperaceae the tetrads have reached their run size. In the Cyperaceae the pollen consists of reduced pollen tetrads in which only one pollen grain cell develops; their development corresponds so closely with that of the Juncus tetrad that a close relationship between the families is indicated. Basic chromosome numbers are 5 in the Cyperaceae, 5 and 3 in the Juncaceae.—J. H. Priestley.

AGRONOMY

Editor: CARLETON R. BALL. Associate Editors: M. A. McCALL, Crops; R. B. DEEMER, Soils

(See also in this issue Entries 16129, 16166, 16169, 16175, 16181, 16184, 16215, 16226, 16229, 16268, 17068, 17551, 17671, 17672, 17676, 17701, 17708, 17731, 17737, 17743, 17798, 17799, 17800, 17806, 17816, 17818, 17864, 17865, 17877)

CROP SCIENCE (ARVICULTURE)

17564. ALSBERG, CARL L. Durum wheats and their utilization. Wheat Studies [California] 15(7): 337-364. 1939.—This study is a conveniently organized collection of material on a distinct species of wheat, Triticum durum. The author divides his discussion into 4 main parts: the durum wheat plant, durum wheat grain, utilization of durum wheat, and macaroni manufacture. Plant characteristics such as structure of roots, leaves, and grains are noted; and the author discusses the historical aspects of the origin and nomenclature of durum wheats. Cultural characteristics are related to various conditions favorable for growth of the plant. The kernel's characteristics of hardness, vitreousness, gluten and protein contents largely determine its utilization in certain forms, especially in macaroni manufacture in several countries. Some discussion is given on the chemical composition of *T. durum*. Its advantages and disadvantages as a bread wheat are related to flour-milling quality and baking quality. The author discusses the suitability and wide use of durum in the manufacture of alimentary pastes. The final part, macaroni manufacture, includes a discussion on the manufacturing process, types and standards, wheat quality for macaroni, and experimental macaroni making. The author notes a number of problems that require further

research and study.—S. Hoos.

17565. BAKKE, A. L. Experiments on the control of European bindweed. Convolvulus arvensis L. Iowa Agric. Exp. Sta. Res. Bull. 259. 367-440. 1939.—C. arvensis, the most serious weed menace in Iowa, has become well established during the past 15 yrs. The aerial shoots generally appear late in April and attain their most profuse growth during June and July. The root system may penetrate to a depth of 20 feet. When evaporation is high, seed setting is abundant. The seeds may remain viable in the soil for several years. Seeds treated with conc. H₂SO₄ germinate promptly. NaClO₂ is the most effective herbicide. The usual conc. employed is I lb. to a gallon of water. Climatic conditions have much to do with the effectiveness of NaClO3 sprays; spraying when temps. are high and humidity low is not as effective as when the humidity is high. Best results have been obtained when sprayings have been made upon the European bindweed when grown in small grain or in a smother crop like millet, when there was a heavy leaf development. Equally good results have been obtained when the bindweed was grown in rye. Winter rye, followed by alfalfa seeded in Aug., is effective in suppressing *C. arvensis*. Soybeans, millet, cane, and sudan grass are effective in reducing the bindweed population. Cultivations twice a week for 2 years did not eliminate all the bindweeds, but proved more effective than cultivations made once a week. Alfalfa is the most valuable competitive crop to use in controlling the European bindweed. The alfalfa should be seeded in Aug. so that a good root system is established. Alfalfa is tolerant of residual NaClO₂ in the soil, but oats, barley and soybeans are quite sensitive to small amts. of NaClO₃. Intensive pasturing with sheep and hogs did not materially reduce the European bindweed

population.—A. L. Bakke. 17566. BäR, A. L. S. Interpretatie van proefveldresultaten. [Arrangement of field experiments.] Landbouwk. Tijdschr. 51: 229-246, 1939.—A critical discussion of the various methods of plotting field expts. and of interpreting numerical data is given from an agricultural point of view. For smallscale expts. Student's method is recommended; Fisher's method is better adapted for more extensive expts. Its calculations are based on the supposition that measured field tests show normal frequency curves; in reality they are skew. This discrepancy is eliminated by application of the van Uven method, but even this is suitable only for certain and titles. Self-englished by a line indicated by Trans conditions. Soil analysis on the lines indicated by Truog and Morgan gives an approximate idea of the relative fer-tility of each field plot. Tobacco expts. are given as an example. Soil conditions proved to be correlated with tobacco quality as judged from different points of view. The qualitative properties are correlated with one another and these facts enable the grower to regulate both yield and

quality of crop.—I. Rietsema.
17567. BRIZI, A. Cotton breeding and seed supply. Rome: Internat. Inst. Agric. 1938. 1-71. 5 fig.—Information is presented on breeding objectives, spp. and vars. of Gossypium, propagation and conservation of vars. and strains, and trends of cotton breeding in major cotton growing countries (with 63 references), as an appendix to the monograph on World Cotton Production and Trade.—Courtesy Exp. Sta.

Rec.

17568. CAPINPIN, J. M., and ARTH NAKORNTHAP. The value of first generation hybrid seed of some regional strains of Lagkitan corn. Philippine Agric. 28(4): 271-285. 1939.—The 1st-generation crosses from 3 strains of Lagkitan maize produced larger ears yielding more shelled grains than the parental stock. The increase in yield of the hybrids ranged from 2.39 to 76.22% in the dry-season planting, and from 4.18 to 62.5% in the wet-season planting.—M. Manresa.

17569. COFFMAN, FRANKLIN A. Heat resistance in oat varieties. Jour. Amer. Soc. Agron. 31(9): 811-817. 1939.—Oat plants of 25 vars., at the 5-leaf stage, were subjected to different temps. for various lengths of time. A temp. of 48½°-52° C for 45 min. gave results indicating differences in heat resistance of oat vars. The vars. differed widely in their ability to resist heat. Vars. adapted to the South,

resistant to cold, and with at least a partial or intermediate winter growth habit, showed the greatest resistance to heat.
Red oats (Avena byzantina) as a group were not more heat. resistant than many vars. of A. sativa. Some vars. belonging to both spp. were heat resistant. Heat resistance apparently is not correlated with time of maturity, with resistance to any of the major oat diseases, with after-harvest dormancy, or with any of the observed morphological characters of the oat kernel.—F. A. Coffman.

17570. COLBY, WILLIAM G., and RALPH W. DONALD-SON. Field corn in Massachusetts. Massachusetts Agric. Exp. Sta. Bull. 356. 1-16. 1 fig. 1939.—Information is given on the adaptations of corn in Massachusetts; choice of years.

on the adaptations of corn in Massachusetts; choice of vars. and hybrids; corn areas; cultural methods and field practices, especially fertilization; and control of European corn borer. Vars. and hybrids grown in comparison at Amherst, 1936-38, are grouped according to maturities with maturity

dates and grain and stover yields.—Courtesy Exp. Sta. Rec. 17571. COSTELLO, DAVID F., and GRAYDON E. KLIPPLE. Sampling intensity in vegetation surveys made by the square-foot density method. Jour. Amer. Soc. Agron. 21(0): 500 510, 1020. The number of 100 as foot when 31(9): 800-810. 1939.—The number of 100 sq. foot plots required for a reliable statistical sample in range surveys varies between portions of a vegetation type and between different types. The number of plots necessary to sample a type bears little relationship to area of the type. Sampling a given area by means of a composite sample requires fewer plots than sampling the area on the basis of range condition classes. Sampling intensity is influenced by seasonal and yearly fluctuations in floristic composition. Either preliminary surveys or samples taken periodically from survey data provide a basis for determining the intensity of sampling required in different vegetation types.

D. F. Costello.
17572. DAVID, PEDRO A. Ramie and its cultivation in Davao (Philippines). Philippine Agric. 28(1): 38-44. 4 fig. 1939.—Ramie, or China grass, Boehmeria nivea, is now extensively cultivated as an export crop by 2 Japanese companies in Davao.—M. Manresa.

17573. DAVIES, R. O., and W. E. J. MILTON. The

response of grasses and clover to treatment on acidic upland soils, and the effect of herbage plants on the reaction of acidic soils. IV. The residual effects of treatment on Molinia and fescue soils. Empire Jour. Exp. Agric. 7(25): 51-62. 3 fig. 1939.—During 7 yrs. the effects of cultivating, manuring and seeding treatments upon the herbage of Molinia and fescue areas were observed. Lowland grasses and wild white clover much improved these areas if cultivation was supplemented by phosphate and limestone. Cocksfoot (Dactylis glomerata) withstood unfavorable conditions far better than perennial rye-grass, and application of N at sowing-time greatly encouraged this species. The Molinia area responded best to treatment during the last 4 yrs. Over 7 yrs., basic slag increased the lime yield in the herbage 3-fold, but only 8.6% of the lime applied in the slag was utilized. Limestone also increased the lime yield and its influence was greater on the Molinia area. P recovery was 19.5% on the latter, compared with 18.1% on the fescue area; the addition of limestone raised these figures to 30.2% and 24.2% respectively. On open hill pastures the best response to manures was obtained on the fescue area, partly due to the preference shown by the sheep for the drier

fescue plots.—E. H. Tripp.
17574. DECOUX, L., J. VANDERWAEREN, et M. SIMON.
Semis precoce et tardif de betterave. Publ. Inst. Belge Amélior. Betterave 5(6): 511-513. 1938.—Comparison of results secured from 2 dates (3 weeks apart) of sowing sugar beets, in which tests the other variables were varieties differentiated by type of top growth, and 3 nitrogenous fertilizers, showed that early seeding, as compared with late seeding, gave an increase of 53.8% of sugar per hectare. 12.7% increase in top yield, 1% in sugar content, some improvement in purity of juices and greater resistance to yellows.—W. W. Robbins.

17575. DULEY, F. L., and J. C. RUSSEL. The use of crop residues for soil and moisture conservation. Jour. Amer. Soc. Agron. 31(8): 703-709. 2 fig. 1939.—Straw left on the surface of soil or only partially covered by disking in-creased materially the moisture stored as compared with straw plowed under and gave a very great increase over disking or plowing without straw. Basin listing stored more water than plowing, but less than where straw was left on the surface. Where straw was left on the surface the land was cultivated and weeds killed by means of broad v-shaped sweeps. This type of cultivation did not cover the mulch. Crop residues left on the surface of the ground not only increase the amount of water that can be saved in the soil by increasing infiltration and reducing evaporation, but also reduce the amount of erosion by wind or water.-

17576. ESPINO, RAFAEL B. Studies on the fertilizing value of Mayon volcano ash. I. Effects upon plants of liberal application of the volcano ash. Philippine Agric. 28

(2): 133-142.3 fig. 1939. 17577. FORT, C. A. Fats and waxes of Louisiana sugar cane varieties. Sugar Bull. [New Orleans] 17(20): 3-4. 1939.
—Surface wax and internal fats of 6 vars, of sugar cane. unfertilized and fertilized with NaNO: and (NH4)2SO4, were estimated separately. The external wax was removed mechanically and recovered with CCl4. Internal fats were obtained by extraction of the dried, disintegrated cleaned cane with the same solvent. Internal fats exceeded external waxes in amounts in all instances. NaNOs as fertilizer caused a greater decrease in fats than waxes. The fats were dark in color and easily decomposed by temps above 100°C. The waxes were lighter in color and little affected by relatively high temps. If they could be economically recovered they would have commercial value. The greatest amt. of wax occurred on the vars. Co. 290 and C. P. 28/19. That from the latter was superior in color and melting point.

-E. V. Abbott.

17578. FORT, C. A., and J. I. LAURITZEN. Acid and gum formation in cane frozen during the 1938 harvest. Sugar Bull. [New Orleans] 17(22): 4-6. 1939.—The immediate deterioration predominating in frozen cane was alcoholic, followed by formation of excess acidity and gums. A method is described for determining the type of fermentation occurring in frozen cane. Cane of the vars., Co. 281 and 290, windrowed after a temp. of 22-40° F kept in the windrow without apparent loss of solids or any fermentation windrow whold apparent loss of solids of any fermentation products; cane windrowed after a temp. of 20-22° fermented slowly, although practically all eyes were killed. Cane windrowed following a series of freezing temps., and that left standing, differed very little in the degree of deterioration. There was no evidence that gum formation occurs except when volatile acids are produced. The presence of except when volatile acids are produced. The presence of excess acetic acid is an indication of probable mannitic fermentation and formation of dextran. From the standpoint of destruction of sugars, alcoholic fermentation is more important than mannitic, but from the processing standpoint a small degree of mannitic fermentation renders the juice worthless.—E. V. Abbott.

17579. FRANKENA, H. J. Kan late stikstofanwending het eiwitgehalte van het gras verhoogen? Ils a late appli-

het eiwitgehalte van het gras verhoogen? [Is a late application of nitrogen able to increase the protein content of grass?] Landbouwk. Tijdschr. 51(620): 26-29. 1939.—A late application (May 12th) increased the protein content in comparison with an early application (March 8th) from 13.2% to 16.3% or from 10.8% to 13.8% according to the time of

cutting the grass.—I. Rietsema.

17580. GERDES, FRANCIS L., WILLIAM J. MARTIN, and CHARLES A. BENNETT. Drying seed cotton. U.S. Dept. Agric. Leafl. 181. 1-8. 3 fig. 1939.

17581. HILDEBRAND, S. C., and C. M. HARRISON. The effect of height and frequency of cutting alfalfa upon consequent top growth and root development. Jour. Amer. Soc. Agron. 31(9): 790-799. 4 fig. 1939.—Triplicate sand cultures of alfalfa plants were subjected to weekly, bi-weekly and monthly cutting intervals at 1, 3, 6, 9 and 12 inches respectively. tively. Yield of tops is recorded in grams dry matter. Cutting treatments continued for a 12-week period after which all the cultures were completely defoliated and followed by 4 more successive weekly defoliations. Cultures cut frequently and close to the crown showed a marked decrease in yield of tops and storage materials in the roots, as evidenced by lack of growth between the intervals of complete defoliation, when compared to those cultures cut less frequently or at higher cutting level. At the 12-inch level of cutting, yield of tops decreased but storage materials inscreased. Photographs showing the condition of the plants

at the beginning and close of the expt. are included.—C. M.

17582. HORTON, H. A., and F. A. STINSON. Investigations in sampling soils previously fertilized for flue-cured tobacco. Sci. Agric. [Ottawa] 19(10): 616-621. 1939.—Increased conc. of soil nutrients persisted in the zone of application for 2 years following the heavy application of fertilizer in rows for tobacco, where the land had not been extensively cross-cultivated during that period. A technique for sampling the soil of such areas, involving the use of a large number of individual samplings taken at random and thoroughly mixed to make a composite sample, was investigated. Representative samples could be obtained 3 weeks after fertilization by sampling at random in at least 100 places over the entire area. This number was reduced to 50 ten weeks after fertilization, and to 25 one year after fertilization. Analyses of composite samples taken according to this procedure showed a fairly consistent agreement

with fertilizer treatment.—H. A. Horton. 17583. ITALLIE, TH. B. van. Eene vergelyking van de voedselopname van voeder- en suikerbieten. [Comparison of the uptake of nutrients by mangels and sugar beets.] Landbouwk. Tridschr. 51: 155-171. 1939.—From a comparison especially of K and Na nutrition of the different groups into which mangels are classified in Holland according to their dry matter content, the significance of Na in the nutrition of the relatively xeromorphous vars. of sugar beets is supposed to reside chiefly in the early growing period, when leaves are developing. The more hygromorphous mangels seem to require almost unlimited quantities of univalent ions and are supposed to require Na throughout the growing season and often as a substitute for

–I. Rietsema.

17584. JENKINS, J. M. Jr. Snap bean production in South Carolina. S. Carolina Agric. Exp. Sta. Circ. 59. 1-16. 5 fig. 1939.—Consisting mostly of general information relating to the extent of the industry, vars., cultural requirements, fertilizers, control of insects and diseases, and harvesting, certain data are included that show that the use of 30 lb. of available N, 100 lb. of available P_2O_5 , and no K has given the most profitable yields. Use of from 50-100 lb. of available K significantly reduced the yields as compared with no K. The harmful effect of K is ascribed to an accumulation from several yrs. of intensive fertilization. Fertilizers having all the N in water-soluble form gave as good yields as those in which 20-50% of the N was in water-insoluble form. Mn and Mg must be included in the

mineral fertilizer.—Courtesy Exp. Sta. Rec.
17585. KRANTZ, F. A., and A. G. TOLAAS. The Red
Warba potato. Amer. Potato Jour. 16(7): 185-190. 2 fig. 1939.—A description of the tuber mutant of the Warba from which the Red Warba was derived and the subsequent behavior of the vegetatively derived progeny. Expts. indicated that the Red Warba is a periclinal chimera in which the inner tissue of the tuber will reproduce the original Warba

var.-F. A. Krantz

17586. LAURITZEN, J. I., and C. A. FORT. Windrowing sugarcane injured by freezing temperatures. Sugar Bull. [New Orleans] 17(3): 1-3. 1938.—The injury to standing cane by mild freezing temps, makes its appearance in the spindle and the tops of the leaves, moving downward as the freezing temps, become more severe, killing the leaves, terminal bud, eyes, and stalk. The number of eyes killed is a fairly accurate measure of the degree of injury. As long as any eyes remained sound, cane of the vars. Co. 281 and 290 remained sound in the windrow for 2 to 3 weeks without abnormal changes. When all of the eyes were killed the results were variable, deterioration depending on a degree of injury not at present measurable. The degree of injury at the time of freezing had a greater influence on subsequent deterioration than did the weather following the freeze.-E. V. Abbott.

17587. LEGGATT, C. W. Statistical aspects of seed analysis. Bot. Rev. 5(9): 505-529. 1939.—A review of the literature (29 references) on variations in seed-testing results, tolerance latitudes, fiducial limits, isoprobes, and sample size and a critical evaluation of proposals made by various authors. Rodewald's classic work of 50 yrs. ago is discussed rather fully since it is believed to be insufficiently known and appreciated. Recent work on the effect on observed variations of differences in size and specific gravity of the components of a seed sample and the law governing this effect are considered in some detail.—C. W. Leggatt.

17588. LLOYD, J. W., and W. L. BURLISON. Eighteen varieties of edible soybeans: Their adaptability, acceptability, culture, and characteristics. *Illinois Agric. Exp. Sta.* Bull. 453. 381-439. 1 pl., 15 fig. 1939.—Coöperative tests in 54 counties indicated the adaptation of the vegetable type of soybeans to production throughout Illinois and the acceptability of the green shell beans as a home garden vegetable. Vars, well adapted to central Illinois also were reported to thrive in other midwestern States, but for northern Illinois, Iowa, and localities farther north early vars. were most reliable. Canners' tests showed the feasibility of processing an acceptable product from certain vars. The 18 superior vars. of edible soybeans tested at Urbana,—i.e., very early, Giant Green; early, 80494, Bansei, and Fuji; mid-season, Illini, Hokkaido, Jogun, Willomi, 80490-1, 89162, 84979, and 87617; and late, Illington, Imperial, 87606, Funk Delicious, Emperor, and Higan—showed wide differences in earliness, duration of edible period, plant height, erectness of growth, appearance of pod, and tendency to shatter. While all yielded well, some were heavier producers than others. The yield of green shelled soybeans was about 2½ times the yield of dry ripe beans. Those most attractive in color and size of pod and size of beans also rated very good in table quality. In the 1938 crop, the protein content of the 18 vars, ranged from 36.43 to 44.13% and the fat content from 18.05 to 22.42%. Most of these vars, are suitable for use as dry beans as well as green shelled beans. For a succession of green soybeans in Illinois one var. should be selected from each group. The method of growing vegetable soybeans was about the same as for growing the field type, except that they were always planted in rows far enough apart to permit cultivation. Harvest for use as green shelled beans may begin as soon as the beans attain nearly full size and the pods appear well filled and green or yellowish green. Mature soybeans should be harvested promptly to avoid excessive shattering and cured properly before threshing. The station's experience indicates that if soybeans contain more than 15% moisture at time of threshing special handling is required to prevent spoilage. Directions for shelling and cooking green soybeans are appended.—Courtesy Exp. Sta. Rec.

17589. LOPEZ, FELIPE R. Effects of varying amounts of ammonium sulfate on moisture content of Lipa clay loam at wilting of rice plants. Philippine Agric. 28(4): 321-337.

17590. MACFARLAN, J. Time of application of nitrogen as a factor influencing the yield of herbage on permanent pasture. Empire Jour. Exp. Agric. 7(26): 155-161. 2 fig. 1939.—A replicated expt. was carried out in 1937 and 1938 to find out if much N was lost by leaching when 3 cwt. [330 lbs.] per acre of NaNO₃ was applied in 2 dressings (spring and summer) to a light loam acid soil in the rainy district of Auchincruive, West Scotland. Time of application of the fertilizer did not affect yields, but rainfall affected them considerably. The percentage recovery of N was high (54-83%).—E. H. Tripp.

17591. McROSTIE, G. P. The thermal death point of corn from low temperatures. Sci. Agric. [Ottawa] 19(11): 687-699. 1939.—Ears of both flint and dent corn vars., of various moisture contents, were subjected to different gradations of low temp. The temps used were a steady temp. of -10° F, a fluctuating temp. of between -10° and 0°, a steady temp. of 0°, a fluctuating temp. of 0° to 15°, a steady temp. of 15°, a fluctuating temp. of 15° to 32°, a steady temp. of 32° and outside temp. Where fluctuating temps, were used the various lots were alternated at 5-day intervals between the 2 temps. mentioned. Moisture groups of below 15%, from 15 to 19.9%, from 20 to 24.9%, and 25% and above were included. Samples were extracted at 5-day intervals for germination tests. The high moisture groups under all conditions of storage suffered severe damage to their germinating ability. This damage was more severe under fluctuating than under steady temps. No appreciable difference was observed between the reaction of flint and dent vars. For safe storage under temp. conditions obtaining in the corngrowing sections of the province of Ontario the moisture

content of field corn should be well below 15%.-G. P.

17592. MILLER, JULIAN C. Further studies and technic in sweet potato breeding in Louisiana. *Proc. Amer. Soc. Hort. Sci.* 36: 665-667. 1938(1939).—Plants are carried over the winter in pots in the greenhouse and transplanted to the field in the spring as soon as all danger of frost is past. The sweet potato vines of these plants are trained in a fan-The sweet potato vines of these plants are trained in a fan-shaped fashion to a 7-foot wire trellis. As soon as the vines become established in the field, the plants are girdled by cutting the vine about \(\frac{3}{2}\) through, \(\frac{6}{2}\) inches from the ground. Blooms usually appear 30-40 days after girdling. Flowers are emasculated late in the afternoon and a paper clip placed over the tip of the flower. Crossing and selfing are done between 8 a.m., and 10 a.m., the following morning after which the flowers are covered with a paper clip. Trellising and girdling have a marked effect upon blooms. Seed capsules are covered with a small cloth bag when about 2 grown and allowed to remain until the seeds are fully matured.—J. C. Miller.

17593. MONROE, C. G., and D. D. HILL. Methods for determining the percentage of seeds, strigs, stems, and leaves in commercial hops. Jour. Amer. Soc. Agron. 31(8): 698-702. 1939.—Seeds, strigs, stems, and leaves add little, if anything to the brewing value of hops. A new method for the determination of the seed content of hops has been developed. This consists of treating the sample with methyl alcohol and drying the sample before analysis. A modification of the method of pre-heating is suggested also. The alcohol solvent method proved more satisfactory than any of the heat methods. The suggested method has been used successfully on 1000 samples of commercial hops.-D. D.

17594. MURRAY, W. G., A. J. ENGLEHORN, and R. A. GRIFFIN. Yield tests and land valuation. *Iowa Agric. Exp.* Sta. Res. Bull. 252. 49-76. 2 fig. 1939.—Corn yields on various areas in Tama and Story Counties were detd., and the degrees of correlation between yield and depth of soil and between yield and slope were studied. In both counties the correlation with depth was significant for depths of 8 in. or less. Slope was less significant as directly considered, but slope and depth showed a negative correlation. Yields of

oats as well as of corn were used in some of the work.—
Courtesy Exp. Sta. Rec.
17595. NORMAN, A. G. Biochemical approach to grass problems. Jour. Amer. Soc. Agron. 31(9): 751-760, 1939. The evaluation of the quality of herbage as feed is the aim of the biochemist. More attention has been given recently to the study of the content of protein and minor constituents than to the carbohydrates and cell wall substances which form the main constituents, and the availability of which determines the digestibility of the forage as a whole. The conventional system of analysis now used is inaccurate and incomplete with respect to this group, and is particularly to be criticized on the grounds that lignin, the presence of which influences digestibility perhaps more than any other constituent, is not included. The developmental changes in composition of rye grass (Lohum italicum) and orchard grass (Dactylis glomerata) were followed by direct analysis. A soluble fructosan is present as a temporary reserve in young grass. Transformations in the type of carbohydrate present may also be an important factor affecting availability.—A. G. Norman.

17596. QUISENBERRY, K. S., and B. B. BAYLES. Growth habit of some winter wheat varieties and its relation to winterhardiness and earliness. Jour. Amer. Soc. Agron. 31(9): 785-789. 1939.—Growth habit as detd. from spring seedings of 28 wheat vars. was studied at 8 expt. stations in the years 1934 to 1936, inclusive. Data on earliness from fall sowing and winter survival from other tests are included in order to study their relation with the degree of winterness. The vars. rank in about the same order for degree of winterness when grown at each of the stations. Degree of winterness is not closely related to time of heading from fall seeding or to winterhardiness in the vars. studied. None of the early vars. was as hardy as most of the late ones. However, a few of the late vars. were no more hardy than

earlier maturing ones.—B. B. Bayles.
17597. RATHER, H. C., and C. M. HARRISON. Starch reserves in the roots of pastured alfalfa when grown alone

and in mixtures. Quart. Bull. Michigan Agric. Exp. Sta. 21(4): 281-291. 4 fig. 1939.—Survival and recuperation of individual plants in a pasture and of each of the several spp. constituting its population were found to be closely correlated with starch reserves in the roots and crowns on the amt, of foliage left following the grazing by means of which new reserves could be synthesized, in other words, the closeness of grazing. Grazing of alfalfa, smooth brome grass or orchard grass closer than 2-3 inches was found inadvisable because of too great depletion of food supply. A pasture mixture of alfalfa and smooth brome grass is grazed down evenly and both species survive; in a mixture of alfalfa and orchard grass the alfalfa is grazed much more closely

and orchard grass the altalia is grazed much more closely because of its greater palatability and it soon dies out while the orchard grass survives.—V. R. Gardner.

17598. ROELOFS, J. W. Bevordering van nieuwe cultures in Nederlandsch Indie. [Introduction of new crops in the Dutch East Indies.] Landbouwk. Tijdschr. 51: 409-423. 1939.—The following plants are recommended for planting: Virginian tobacco, Derris elliptica, Hibiscus sabdariffa, Pinus markusii Acain decurrens Voluntia voluncea and Amorphomerkusii, Acacia decurrens, Volvaria volvacea and Amorphophallus species. Recommended for trial are: Aleurites montana, A. fordii, Ceiba pentandra, Gossypium obtusifolium, Musa textilis, Eugenia aromatica, Melaleuca leucadendra, Pelargonium radula, Orthosiphon grandiflorus, Curcuma xanthorrhiza and Cucurbita moschata. Trials of Linum usitatissimum and Boehmeria nivea are suggested.—I. Rietsema.

17599. SCHULTZ, ENRIQUE F. Las pencas sin espinas, Opuntia inermis. [The spineless cactus, O. inermis.] Rev. Indust. y Agric. Tucuman 28(10/12): 220-222. 1 fig. 1938. O. inermis is recommended as a pasture crop and as an emergency feed in regions of very low rainfall and during seasons of marked drought. Culture methods and procedures of handling and feeding are given.—J. W. Gilmore.

17600. SNELL, K. [Seed certification in Germany.]

Chron. Bot. 5(1): 53, 54, 1939.—This is a discussion of the

legal regulation adopted in Germany whereby only certified seed (tested for variety, purity, and condition in respect to disease) is to be allowed in commerce. Certification is to be granted on the basis of field inspection of the plants and also in many cases of further testing of the seed ready for sale. The number of vars is to be restricted to those considered most desirable. New vars. are to be substituted for less desirable vars. on the governmental variety list only after tests for yield, quality, and disease resistance at scientific institutes. Beginning in 1941 only vars. of potatoes immune to potato wart disease will be permitted to be grown. Only immune vars. may now be certified for seed purposes.

Only immune vars. may now be certained for seed purposes. The earlier studies were carried out with respect to grain vars., and not until recent years were other kinds of agricultural plants included.—Courtesy Exp. Sta. Rec. 17601. SULLIVAN, J. T., H. R. KRAYBILL, C. B. GUSTAFSON, G. H. CUTLER, G. A. BRINSON, R. R. MULVEY, and G. P. WALKER. Effects of fertilizer applications and other cultural practices on some kernel characteristics of winter wheat. *Indiana Agric. Exp. Sta. Bull.* 432. 1-48. 2 fig. 1938.—Numerous samples of Purkof, Michigan Amber, Purdue Nos. 1 and 3, and 21-2-11 wheat, grown in 1921 22 on fartilizar retains and cultivation to the same same support to the same support to 1931-33 on fertilizer, rotation, and cultivation test plats in different locations in Indiana, were subjected to chemical, milling, baking, and other tests. Spring applications of N fertilizers tended to increase the hardness characteristics, such as percentages of protein and of vitreous kernels, especially in wheat receiving the latest application on May 20, but did not increase significantly fermentation time, granulation number, and test weight. N applied in autumn had very little effect on the hardness characteristics. Previous ous legume crops in rotation tended to increase vitreousness and amt. and quality of protein, as well as test weight. P applied alone or in mixed fertilizers increased yield and decreased vitreousness, protein content, and the loaf volume, and had small effect on granulation number. In many instances fermentation time was increased, although quantity of protein was lowered. Effects with superphosphate were more marked than with rock phosphate on limed plats, but the larger amts. of rock phosphate were more effective than superphosphate on unlimed plats. Plats never fertilized pro-duced wheat of low yield, shrunken grains, and relatively high protein content. Lime alone increased yield considerably, but the kernels were still small and high in protein.

Complete fertilizers used with lime resulted in higher yields and wheat with lower protein content, higher kernel weight and test weight, and lower vitreousness. Clover preceding wheat in the rotation increased hardness as measured by protein content, vitreousness, and time test, while wheat preceding wheat decreased these hardness characteristics. Milling and baking tests on a limited number of samples indicated that protein content of milled fractions and, in general, loaf volumes, were correlated with protein content of wheat—Courtesy Erra Sta Rec

general, loaf volumes, were correlated with protein content of wheat.—Courtesy Exp. Sta. Rec.

17602. TAYLOR, J. W., B. B. BAYLES, and COLBURN C. FIFIELD. A simple measure of kernel hardness in wheat. Jour. Amer. Soc. Agron. 31(9): 775-784. 1939.—A simple pearling test for measuring the hardness of wheat kernels is described. The test is economical with respect to equipment, time, and quantity of grain. The results are consistent with what is known regarding the relative hardness of different vars. and very high interstation correlations were obtained. High correlation coefficients were found between the percentage of the kernels pearled off and the particle size index. Only slightly lower negative correlation coefficients were obtained between the percentage of kernels pearled off and the doughball time. Certain vars., however, reacted quite differently to the 2 tests. Little correlation was found between the percentage pearled off, particle size index, doughball time, and protein content of the grain of the vars. studied.—B. B. Bayles.

17603. WILSON, B. D., and E. V. STAKER. Neutralization curves for the humic acids of peat soils. [New York] Comell Univ. Agric. Exp. Sta. Mem. 219, 1-19: 6 fig. 1939.— Humic acids variously extracted from peat soils were titrated by means of a glass electrode and Ba(OH), the nature of the acidity being indicated by neutralization curves. The neutralization curves resembled those characteristic of weak acids. Some of the humic acids showed a break in the curves, others did not. Whether or not a break appeared seemed to depend more on the method employed in preparing the humic acids than on the organic material used in making the extract. The absence of more than one break in the neutralization curves for acids which are generally considered to be polybasic may have been occasioned by the presence of mixed groups of acids, the dissociation constants of a particular acid or group of acids being indistinguishable because of the reaction effects of other acids. The character of the neutralization curves is closely related to the cation-exchange capacity and to the nutial reaction of the humic acids.—Courtesy Exp. Sta. Rec.

17604. WRIGHT, L. E., J. C. WOODWARD, and C. H. COBINSON. Mineral composition of soils and forage crops a eastern Canada. I. Timothy hay and oat straw. Sci. toric. [Ottawa] 19(11): 673-686. 1939.—Paired samples of imothy hay, oat straw and soil were collected from 110 epresentative farms in Eastern Canada and analysed for and various mineral constituents. There was no "overly relationship between Ca and P content of hay or raw and the exchangeable Ca and soluble P of the soil. here was a significant positive correlation of the N of mothy hay with the N in the soil. The Ca content of the hay and straw was significantly greater when the ops were grown on sandy loams than when grown on a loams. The clay loam soils were higher in total Ca, changeable Ca, and soluble P than the sandy loams. here was some evidence that phosphatic fertilizers need to increase the P content of hay or straw in certain stances where the soluble soil P was particularly low. sported instances of mineral deficiencies in live stock are not related to Ca or P content of hay or straw.—

E. Wright.

SOIL SCIENCE (EDAPHOLOGY)

17605. ALEXANDER, L. T., S. B. HENDRICKS, and A. NELSON. Minerals present in soil colloids: II. Estition in some representative soils. Soil Sci. 48(3): 273-11939.—Minerals present in the colloidal fraction of soils from continental U. S. were identified and their ounts estimated by use of the chemical, thermal, and sy diffraction methods previously discussed. Kaolinite if free oxides and hydrous oxides of iron were the prepinant components of the red podzolic soils examined.

Gray-brown podzolic soil colloids contained these minerals associated with appreciable amts. of hydrous mica. Single examples of colloids separated from soils of the chernozem, prairie, and desert groups were studied.—Auth. summ.

17606. CARPENTER, E. J., and S. W. COSBY. Soil survey of Contra Costa County, California. U. S. Dept. Agric. Bur. Pl. Indust. 1933(26): 1-83. Map, 3 pl., 3 fig. 1939

17607. COLLINS, E. R., and F. R. SPEER. Decomposition of dolomitic limestone in soils when used as a neutralizing agent in complete fertilizers: Studies on Dunbar very fine sandy loam, Ruston sandy loam, Norfolk fine sandy loam, and Portsmouth fine sandy loam. Jour. Assoc. Offic. Agric. Chem. 22(1): 142-147. 1 fig. 1939.—The purpose of this study was to determine the rate of decomposition of the dolomitic limestone as evaluated by reaction change in the soil and by the determination of residual carbonates after a crop of cotton had been grown on it for from 65 to 75 days. Mg detns. were made on a few plant samples to indicate any change in the conc. of Mg in the plant due to the decomposition of the dolomitic limestone during the growing season.—Courtesy Exp. Sta. Rec.

17608. ESPINO, RAFAEL B. Studies on the fertilizing value of Mayon volcano ash. II. Beneficial effects of adding ammonium sulfate. *Philippine Agric*. 28(4): 260-270. 6 fig. 1930

17609. FEUSTEL, IRVIN C., A. DUTILLY, and M. S. ANDERSON. Properties of soils from North American arctic regions. Soil Sci. 48(3): 183-199. Map, 1 pl. 1939.— A group of 37 soils and soil materials collected from the arctic region of northeastern N. America was examined by the usual methods. The samples comprised both inorganic and predominately organic materials. Lack of profile development as well as certain chemical and physical characteristics is indicative of their extreme immaturity as soils. Much of the material consisted of particles in the coarser size groups. The clay content was generally small, only 3 of the samples having as much as 20% and a majority of the remainder having less than 5%. The wide range of C/N ratios in the organic materials was comparable to the variation found in peats and mucks of the U.S. The C contents, calculated on an ash-free basis, however, appear to be lower than those of peat samples of this country. Ash analyses indicated, on the whole, no striking differences, except perhaps for low content of S, as compared with ashes of peats and mucks from temperate regions. Examinations of the colloids extracted from a group of the mineral soils show silica-base ratios of 5.5 or lower and accompanying silica-alumina ratios of 3.0 to 3.7. These and other factors are indicative of their extreme immaturity or of only a slight chemical alteration. Hydrous mica was shown by x-ray and heating curves to be the dominant clay mineral present.-Auth. summ.

17610. FITZPATRICK, E. G., W. C. BOATRIGHT, and L. E. ROSE. Soil survey of Garfield County, Oklahoma. U. S. Dept. Agric. Bur. Pl. Indust. 1935(5): 1-48. Map, 2 pl., 2 fig. 1939.

17611. FITZPATRICK, E. G., L. E. ROSE, and W. C. BOATRIGHT. Soil survey of Murray County, Oklahoma. U. S. Dept. Agric. Bur. Pl. Indust. 1935(8): 1-46. Map, 2 pl., 2 fig. 1939.

17612. FRAPS, G. S., and A. J. STERGES. Possible losses of nitrogen from acid soils through the decomposition of nitrites. Soil Sci. 48(3): 175-181. 1939.—Previous statements to the effect that nitrites are decomposed by acid soils are confirmed. There was no loss of N which could be ascribed to formation and decomposition of nitrites during the nitrification of (NH₄)₂SO₄ in 23 of 24 soils which require additions of CaCO₅ for good nitrification. There was some loss with one of the subsurface soils, indicating that in rare cases nitrites may be formed during the nitrification of (NH₄)₂SO₄ and decomposed chemically in acid soils with loss of N.—G. S. Fraps.

17613. GALVEZ, N. L. A study of the base-forming elements in soils. *Philippine Agric*. 28(2): 143-151. 1939.— The base-forming soil elements, Ca, Mg, K and Na, exist in varying amts. in soluble forms, soil complex, and soil minerals. In these 3 forms the divalent bases were found

to exceed the monovalent. The soil minerals contain the most bases, and the soluble forms the least .- Auth. abst.

17614. GILLIGAN, G. M. The effect of degree of base saturation of soils upon the fixation of phosphate and potassium and the availability of phosphorus. Delaware Agric. Exp. Sta. Bull. 215. 1-20. 8 fig. 1938.—Three soils (one highly organic) were deprived of their exchangeable bases by electrodialysis, and series of these soils with increasing Ca saturation were prepd., to determine the effect of degree of Ca saturation on the sorption of P and K. Phosphate sorption was influenced by both degree of Ca saturation and pH. Appreciable fixation took place in the hydrogen soils. This type of sorption is attributed to the formation of difficultly soluble Fe and Al phosphates. A decrease in sorption in the lower Ca soils and slightly acid range was observed with one organic and one inorganic soil. Sorption in the Ca soils is looked upon as a function of the exchange complex and pH and influenced by the nature of the exchangeable ions involved. At high Ca levels (in the presence of high Ca-ion concs., high pH, and CaCO₃) the high sorption values observed are attributed largely to the precipitation of insoluble Ca phosphate. The mechanism precipitation of insoluble Ca phosphate. The mechanism of phosphate sorption by the organic soil is considered to be less complicated than that taking place in inorganic soils. The sorption curve resembles the precipitation curve obtained when a mixture of an organic acid in a H_3PO_4 is titrated with $Ca(OH)_2$. Sorption of K in a nonexchangeable form increased with increasing degree of Ca saturation in the inorganic soils. The organic soil failed to fix K in a nonexchangeable form.—It is advisable to maintain the soils investigated at a Ca level sufficiently high to avoid the formation of insoluble Fe and Al phosphates yet somewhat below complete saturation where insoluble Ca phosphate is precipitated. Demobilization of K would be anticipated as a result of overliming.— Courtesy Exp. Sta. Rec.

17615. GOKE, A. W., E. R. WEBSTER, and D. F. MOINE. Soil survey of Decatur County, Iowa. U. S. Dept. Agric. Bur. Pl. Indust. 1935(7): 1-28. Map, 1 fig. 1939.

17616. HENDRICKS, STERLING B., and LYLE T. ALEXANDER. Minerals present in soil colloids: I. Descriptions and methods for identification. Soil. Sci. 48(3):

257-271. 2 pl. 1939. 17617. KELLEY, W. P., W. H. DORE, A. O. WOODFORD, and S. M. BROWN. The colloidal constituents of California

and S. M. BROWN. The contour constituents of Cambrida soils. Soil Sci. 48(3): 201-255. 1939.

17618. LATIMER, W. J., M. H. LAYTON, W. H. LYFORD, W. H. COATES, and P. N. SCRIPTURE. Soil survey of Grafton County, New Hampshire. U. S. Dept. Agric. Bur. Pl. Indust. 1935(6): 1-79. 2 maps, 2 pl., 1 fig.

17619. NIKLEWSKI, BRONISŁAW, i JAN WOJCIE-

CHOWSKI. The influence of humic compounds on the plant development. [In Pol. with Eng. summ.] Acta Soc. Bot. Polon. 15(2): 61-109. 9 fig. 1938.—Humic compounds Bot. Polon. 15(2): 61-109. 9 fig. 1938.—Humic compounds act on the root development, especially in the cultures without any or with insufficient quantities of mineral salts. In the presence of full mineral nutrition the humus causes a stronger development of the stems and leaves and especially an abundant formation of chlorophyll. It is a question, whether the activity of the humus soin. depends upon the absorbed ions of K, P, Fe and perhaps on the microelements or only on the humic compounds.—F. A. Gilbert. 17620. NIKLEWSKI, BRONISŁAW, i JAN WOJCIE-

CHOWSKI. The influence of humic compounds on the absorption of ammonium phosphate — (NH₄)₂HPO₄ — and sulphate — (NH₄)₂SO₄ — by plants. [In Pol. with Eng. summ.] Acta Soc. Bot. Polon. 15(2): 111-151. 1938.—Expts. on the influence of humus conc. on the absorption of the ammonium phosphate and sulphate by mustard, buckwheat and hemp under the influence of humus showed that in the presence of humus there is much greater absorption of cation and anion. The best effect of humus is more or less in the conc. of 1.9-3.8 or 1.1-2.2 mg of humus per 200 cc. of the soln. The influence of the humus may be explained by the constant change of the plasma structure. In this case the roots were placed in the humus soln., and then taken out, washed and afterwards placed in a mineral soln.; the plants treated in this way absorbed the salt just as well as if they were given salt together with humus. -F. A. Gilbert.

17621. SADASIVAN, V., and A. SREENIVASAN. Solubilization and movement of organic forms of nitrogen in the soil. Soil Sci. 48(3): 161-174. 1939.—Laboratory expts. on the causes and extent of fluctuations of N in the soil from season to season showed that there is an appreciable solubilization of organic forms of N in the soil. The changes in mineralized (NH₂ and NO₃) and total watersoluble N during the decomposition of added organic matter such as rice straw, leaves of *Pongamia glabra* and *Lantana* camara and seed cake were followed. Lime flocculates a part of the organic forms of N in soln. Under swampy conditions, large quantities of organic N are rendered soluble by decomposition and under flooded conditions, there is greater loss of total N. The proportion of watersoluble or peptized organic N is greater in the latter case. Only slight quantities of organic N are rendered water-soluble by addition of NaCl but there is greater loss of total N. The changes in mineralized and total N were studied at different depths; during decomposition there is considerable movement of all forms of N. The significance of such movements in relation to periodic fluctuation in soil N and to the supply of available nutrients from the subsoil is discussed.—V. Sadasivan.

HORTICULTURE

F. C. BRADFORD, Editor

(See also in this issue Entries 16129, 16153, 16226, 16229, 16234, 17566, 17592, 17598, 17671, 17677, 17684, 17695, 17697, 17710, 17715, 17716, 17754, 17768, 17777, 17803, 17805, 17808, 17840, 17862)

17622. BAILEY, JOHN S., HENRY J. FRANKLIN, and JOSEPH L. KELLEY. Blueberry culture in Massachusetts. Massachusetts Agric. Exp. Sta. Bull. 358. 1-20. 12 fig. 1939. This bulletin includes general information on cultural requirements, propagation, pruning, control of insects and diseases, harvesting and marketing, etc. Studies in the improvement of wild high-bush vars. [Vaccinium corymbosum] showed that the removal of competing trees and vegetation increased the growth of blueberry bushes. Pruning, where not excessive, increased growth and yields. Fertilizers, particularly N, increased growth and yields, the latter mostly from an increased number of fruits per plant. Fertilized bushes showed a tendency to annual bearing, and the berries on fertilized plats were firmer during dry periods. A combination of fertilization and pruning was much more effective than either alone. Any treatment that increased terminal shoot growth up to about 10 in. increased yield; above 10 in. the growth tended to become overvegetative.—Courtesy Exp. Sta. Rec. 17623. BEAKBANE, A. BERYL, and ELEANOR C.

THOMPSON. Anatomical studies of stems and roots of hardy fruit trees. II. The internal structure of the roots of some vigorous and some dwarfing apple rootstocks, and the correlation of structure with vigour. Jour. Pomol. and Hort. Sci. 17(2): 141-149. 8 fig. 1939.—Transverse sections of 86 four-year-old apple trees on Malling Nos. VII and IX and of 8 new clonal rootstocks were worked with Lanes' Prince Albert. The new rootstocks were a cross between the 2 dwarfing rootstocks, Nos. VIII and IX. The dwarfing rootstocks have a much higher bark: wood ratio and a higher proportion of wood ray tissue than the vigorous rootstocks. Relative to their size, the vigorous rootstocks have a smaller volume of cells capable of storing carbohydrates. Trees worked on vigorous rootstocks, therefore, have smaller carbohydrate reserves available for the formation of fruit buds than those on dwarfing rootstocks. Shoot growth is restricted in trees worked on dwarfing rootstocks because the passage of mineral salts in soln. through the small vessels in the wood is very slow. Vigorous root-

stocks have more numerous wood fibers than the dwarfed rootstocks.-E. L. Overholser.

17624. BEAUMONT, J. H. An analysis of growth and yield relationships of coffee trees in the Kona district, Hawaii. Jour. Agric. Res. 59(3): 223-235. 1939.—A study of yield and growth relationships of one group of coffee trees, 7 years of age, low in vigor and production, and a 2d group, 12 yrs. of age, high in vigor and production, indicated that many relationships were common to the 2 groups. Certain growth responses of the coffee tree appeared to depend on the size of the developing crop, which in turn was conditioned by tree growth made in the preceding growing and crop season as well as by spring rains in the preceding year. Judicious pruning, fertilizing, and perhaps other cultural practices might reduce the extreme fluctuations in annual yields and increase the average yield, general size, and vigor of the tree.—K. W. Pierson.

17625. COCHRAN, H. L. Growth and distribution of roots of the Perfection pimiento in Georgia. Jour. Agric. Res. 59(3): 185-197. 11 fig. 1939.—As soon as the seed days, the young primary root grows typically directly downward. By the time the plants are ready to set in the field (April 28) the primary roots extend down to the 10- to 12-inch level and are well supplied with laterals 4-10 inches long and about 0.6 mm. in diam. After 60 days in the field the roots completely occupy the first foot of soil on all sides of the plants to a depth of 14 inches. By Aug. the larger and more deeply penetrating roots extend outward 40 inches from the base of the plant and downward as deep as 26 inches. Mature plants have a root spread of 48-52 inches with many of the once horizontal laterals being found in the 2d foot of soil. Few roots penetrate the stiff clay subsoil any deeper than 2 feet.-H. L. Cochran.

17626. COOPER, J. R., and J. E. VAILE. Response of American grapes to various treatments and vineyard pracices. Arkansas Agric. Exp. Sta. Bull. 378. 1-74. 1939.-Jutting back grape plants to 2 buds at the beginning of he 2d year in the vineyard retarded root growth and lelayed fruiting. Fruit-bud initiation began in June and ontinued throughout the summer, but individual flower levelopment occurred the following spring. Buds on the ame cane increased in fruitfulness from the 1st to the 4th ud and remained approx. the same except for immaturity ear the ends of the canes. For this reason long renewal runing is advisable. For sustained yields not more than) fruiting buds should be left in pruning. Summer pruning duced the quality of fruit and aggravated uneven ripening, ssides reducing available fruiting wood for the following ason. Thinning by removing clusters reduced yield almost proportion to the amount of thinning done but increased ze of cluster slightly and encouraged more even ripening. eavy pruning by reducing the crop in proportion to foliage couraged more even ripening. Fertilizers proved profitable light soils such as Upshur and Hanceville fine sandy am but not on Clarksville silt loam. Cutting original uiting canes back to 3 to 6 buds after frost injury provided e most satisfactory fruiting wood for the following year. ie use of vigorous vars. as rootstocks for Campbell Early, oore Early and Concord grapes increased production by reasing size and number of clusters.—J. R. Cooper. 17627. FRAPS, G. S., and J. F. FUDGE. Iodine in city ters and vegetables in Texas. Food Res. 4(4): 355-362.

9.—The average iodine content in city waters ranged m 24 parts per billion in the East Texas Timber Country 114 p.p.b. in the High Plains, with a general average 56 p.p.b. for 103 samples collected throughout the state. n 44 samples of vegetables ranged from 62 to 3,502 b. The I content of vegetables varied widely with the tion of the plant used as food, the variety, location, soil. Vegetables grown in Texas are usually high in I.—

7628. HALLER, M. H., and P. L. HARDING. Effect storage temperatures on peaches. U. S. Dept. Agric. h. Bull. 680. 1-32. 1939.—The firmness of a number of s. of peaches when picked in a shipping ripe condition erally averaged between 9 and 14 pounds (pressure test). etically no softening occurred in storage at 32° F, but the of softening increased with increased temps, and was

very rapid at 70° and 80°. The respiratory rate also in-3.8 to 6.2 mg. CO₂ per kg, per hr. at 32° to 81-141 mg. at 80°. Storage temps. did not consistently affect the percentage of dry weight and sugars in peaches, but the percentage of total and active acidity was somewhat reduced at 50° and markedly reduced at intermediate temps. of 40° and 36°, although a lower temp. (32°) or higher temps. (60°-80°) had little or no effect. The rapid loss of acidity at the intermediate temps. was associated with abnormal ripening as shown by poor dessert quality at 50° and the development of internal breakdown at 40° and 36°. The normal ripening and softening of the fruit were associated with a large increase in soluble pectin. Development of internal breakdown was not associated with catalase activity.—Peaches should be cooled promptly and stored at 32°; their storage life is limited to 2 to 4 weeks, de-

pending on var. and growing conditions.—M. H. Haller.

17629. HASSIB, MOHAMMED. Cucurbitaceae in Egypt.

Egypt. Found 1 University Fac. Sci. Publ. 3. viii+173p.

65 fig. 1938.—An illustrated account, with keys and descriptions, of this family, both as occurring wild and in cultivation. Horticultural varieties are distinguished. Apparently there are new subspecies, varieties, and subvarieties under *Cucumis melo*, and many phenotypes contrasted by key under *Citrullus vulgaris*. Detailed bibliographic synonymy and Arabic and other names are given. . W. Pennell.

17630. HENNEKE, K. F. W. Normalisatic voor cultureischen. [Normalization for cultural requirements.] Landbouwk. Tijdschr. 51: 178-180. 1939.—A proposal to indicate cultural requirements and use of plants in catalogues and dictionaries by means of ciphers. 148/9.215.02 would mean: decorative perennial for flower cutting to be would mean: decorative perennial for flower cutting to be sown in cold frame, to be planted out in the open and to be kept during 20 months; not attacked by diseases and by only a few insects.—I. Rietsema.

17631. LANUZA, EPITACIO A. Notes on bud differentiation in carabao mango (Mangifera indica L.). Philippine Jour. Agric. 10(2): 131-151. 7 pl. 1939.

17632. LEVINA, E. D. On chemico-genetic study of the plant. Compt. Rend. (Dokhda). Acad. Sci. URSS. 19(1/2).

plum. Compt. Rend. (Doklady) Acad. Sci. URSS 19(1/2): 83-86. 1938.—Cultivated plums are thought by geneticists to have originated as a cross between Prunus spinosa and P. cerasifera. Studies of the sugar, citric acid, and tannin components of the two plums, as well as of cultivated plums, both when mature and at various stages of ripening,

confirm this opinion.—O. Raber.
17633. MARSHALL, ROY E. Permanence of size differences in orchard trees. Quart. Bull. Michigan Agric. Exp. Sta. 21(4): 265-277. 1939.—In a study of the records of 5 vars that had been growing in an exptl. orchard 15 yrs. and for which yearly trunk-circumference measurements had been obtained it was found that with few exceptions the largest trees at the time of setting had maintained their lead over the smaller ones. In many instances the initial differences gradually became more accentuated. At 12-14 yrs. of age the trees larger at the start averaged about one growth year larger than the ones that were smallest at the start—the initial size differences being only those usually found within a single grade of nursery stock. Measurements of tree top volumes substantiated the figures for trunk circumference.—V. R. Gardner.

17634. MARTIN, WILLIAM E. Nitrogen nutrition in relation to yield and quality of grapefruit. Plant. Physiol. 14(3): 606-607. 1939.—High N content of the tissue of the tree at the time of blossoming is followed by a relatively large set of fruit. Present evidence suggests that high quality fruit at harvest follows a relatively low N content of the tree during the summer and fall and may be materially affected by fertilizer and cultural practices carried out during the growing season.—W. E. Martin.

17635. MAZANKO, F. P. On a new method of tausaghyz exploitation. Compt. Rend. (Doklady) Acad. Sci. URSS 19(1/2): 95-98. 1938.—The profuse formation of rubber in the latex vessels of this plant and its rapid regeneration after effusion permit it to be exploited by tapping the roots below the crown. The best time to tap the roots is at the period of transition to the state of summer rest and leaf drying. This method makes it possible to remove about 8-10 rubber swellings during the season. This secures the maximum yield of high-quality rubber, does not impair the vitality of the plant, and permits subsequent tappings in later years.—Oran Raber.

17636. MERCADO, TORIBIO. A comparative study of

two bud sports of cassava and their parent varieties. Philippine Agric. 28(4): 308-320. 1939.

17637. PHILLIPS, W. R. Gas storage. Ann. Rept.

Pomol. and Fruit Growing Soc. Prov. Quebec 45: 39-40. 1938.—McIntosh apples suffer severely with core flush at low storage temps, and 32°F is unsafe. If core flush is controlled by storing at higher temps, the storage life reduced. Gas storage (7% CO₂ and 14% O₂) at 39°F

materially extends the storage life.—H. Hill.

17638. TORRES, JUAN P. Progress report on citrus hybridization: Propagation. Philippine Jour. Agric. 10(2): 95-119. 9 pl. 1939.—The methods used in rearing intra- and interspecific citrus hybrid seedlings as well as budded plants are presented. Propagation of polyembryonic types of citrus by inarching combined with tongue-grafting was found of practical value. It provides some citrus hybrid

seedlings with double root systems.—M. Manresa.
17639. VANSTONE, ERNEST, and CHARLES E. H. 17639. VANSTONE, ERNEST, and CHARLES E. H. KNAPMAN. On the quantities of nitrogen, phosphoric acid, potash and lime removed from the soil by a crop of Roscoff broccoli during its growth. Jour. Pomol. and Hort. Sci. 17(2): 85-98. 1939.—Winter cauliflower or broccoli is important in Cornwall and Devon, England. The plants studied were sown April 25 and planting out was made June 4, 1937. At planting, fish manure at the rate of 5 cwt. [550 pounds] per acre was applied, supplying 28.78 lbs. N, 36 lbs. P₂O₅, and 56 lbs. K₂O to the acre. Maturity was reached in April, 1938. Through analyses of the stem, leaves curds. and roots the crop was found to remove leaves, curds, and roots, the crop was found to remove from the soil on an acre basis essential inorganic materials at the rate of 204 lbs. N, 70 lbs. P₂O₅, 240 lbs. K₄O, and 110 lbs. lime. These inorganic materials were stored mostly in the leaves, the curds, the stems, and the roots. Analyses of broccoli grown in Cornwall and in Devon showed that there was a general similarity in the composition of the plant, independent of location and manuring.—E. L. Overholser.

17640. WILLIAMS, C. F. Fall fertilization of peach trees in the Sandhills. Bull. N. Carolina Agric. Exp. Sta. 321. 1-15. 3 fig. 1939.—Based on studies with bearing and young trees it was found that N from NaNO₃ was assimilated by the roots of peach trees during the dormant season if the temps, were above freezing, but was not translocated to the above-ground parts unless temps. were above 45° F. Although nitrate applied to bearing trees in Nov. and Dec. produced a response in growth and yield equal to the same rates of application in March, reserves in the tree were not increased before Feb. unless the nitrate was applied in Aug. or Oct. Longer terminal growth and larger yields resulted if the trees went into the dormant period in his little was applied to the little were considered. in high N condition, but fewer buds per shoot resulted unless the trees also had an application of N in March. The data suggested the need of good nutritional conditions throughout the season rather than heavy fertilization at

any one time. Available nutrients were as important after the period of length growth and harvest in creating food reserves in the trees as they were in early spring for producing length growth. Postharvest applications of nitrate did not encourage late growth but did tend to avoid premature dormancy and thereby increased the resistance of the trees to winter injury. Postharvest applications of nitrate provided N for the winter period, but a fertilizer program including more slowly available materials applied in spring and early summer should be just as effective under most conditions. The use of cover crops is suggested as a means of providing a more constant supply of nutrients.—Courtesy Exp. Sta. Rec.

17641. WILLIAMS, C. F. Nitrogen fertilization of bear-

ing Elberta peach trees in the Sandhills. Bull. N. Carolina Agric. Exp. Sta. 322. 1-24. 4 fig. 1939.—To Elberta trees 8 yr. old at the beginning of the 5-yr. study and uniformly treated with respect to P and K and growing on a sandy soil containing little humus and low in native fertility and soil containing little humus and low in native fertility and moisture-holding capacity, N in the form of NaNO₂ was applied in different amts. at different seasons and in single and split applications. During the 5-yr. expt. yields decreased each yr. on all treatments, and after the 2d yr. were unsatisfactory. In the 1st season, increases in the rate of nitrate application increased yields, but after the initial year the differences in yield between 3 and 6 lb. of NaNO₃ per tree were small. The 1st yr. yields and growth increased with earliness of applications, but in the succeeding yrs the highest yields were often sequend with succeeding yrs. the highest yields were often secured with treatments including an application after harvest. Apparently, postharvest treatments tended to delay leaf fall and dormancy and thus decreased the response of the trees to warm weather during the winter. Postharvest applications resulted in a high nutritive condition during the fall and winter and resulted in greater terminal growth the following year. Differential N treatments affected the rate of terminal growth but not at the time of its occurrence. There was no effect of the different treatments on the time of bloom. Increasing the total amt. of NaNO, applied before harvest tended to delay fruit maturity. Winter injury occurred only in trees of an extremely low nutritive condition. On the whole, it appeared that a more or less constant supply of nutrients was more desirable than heavy

N fertilization at any one time.—Courtesy Exp. Sta. Rec. 17642. WOODMAN, R. M. Effects of variation in the supply of potash to lettuces grown under glass. Jour. Pomol. and Hort. Sci. 17(2): 167-180. 1939.—Lettuce was grown as sand cultures under glass to discover the effects of deficiencies in the supply of K on plant growth, yield and appearance. May King lettuce grown in sand showed very little response to K over a wide range of conc. Very very little response to K over a wide range of conc. Very small amts, gave moderately good growth, and the lack of K resulted in a small plant. The lack of K in the cultures primarily gave a slightly darker green foliage that later became chlorotic. Such plants showed a rapid and severe scorch and withering of the older leaves, such leaves becoming convex and having a wavy appearance. Large applications of K did not result in an earlier maturity of the May King lettuce.—E. L. Overholser.

FORESTRY

W. N. SPARHAWK, Editor

(See also in this issue Entries 16252, 17512, 17534, 17598, 17757, 17767, 17837, 17851)

17643. AGUILAR, LUIS. The mechanical properties of apitong from Tayabas Province and Negros and Basilan Islands. Philippine Jour. Forest. 2(2): 145-159. 1939.— Apitong, the wood of some 15 dipterocarp spp., is the most abundant structural timber of the Philippines. Strength values of wood samples from 4 localities are compared.— W. N. Sparhawk.

17644. BURKART, W. Zuwachsleistungen im Escherwald, Gemeinde Morissen in Graubünden. Schweiz. Zeitschr. Forstw. 90(7/8): 239-243. 2 pl. 1939.—This forest of spruce and Pinus cembra was planted in 1874-1890. At the end of 1937 the total volume of trees over 16 cm. in diam. was 279 cu.m. per ha., and 89 cu.m. per ha. had been cut, so that the mean annual increment at ave. age of 55 yrs. was 6.7 cu.m. This is much more than had been expected for a forest at an altitude of 1,550-1,680 m.-W. N. Sparhawk.

17645. CRIVELLARI, DINO. Esperimenti di rimboschimento dei "magredi" dell'alta pianura occidentale friuliana. [Experiments in reforestation of the Friulian plateau.] Riv. Forest. Ital. 1(1): 49-60. Map, 7 fig. 1939.—The 13 spp. used in reforesting this poor pasture land in northern Italy include ailanthus, locust (*Robinia*), several elms, poplars, Scotch and Austrian pines, hornbeam, cypress, alder, ash, and hackberry. Trees planted in previously plowed ground grew better than those planted in prepared holes in un-plowed ground. Ailanthus and locust grew the best. Siberian elm promises to do well. Chemical fertilizers (superphosphate and (NH₄)₂SO₄) stimulated growth on tilled areas; limestone was less effective.—W. N. Sparhawk.

17646. CROMER, D. A. N. Frost resistance of bunya pine. Australian Forestry 4(1): 39-40. 1939.—In order to determine the frost resistance of Araucaria bidwillii, potted 18-month-old seedlings were subjected to controlled temps. in a refrigerating chamber. They were entirely unaffected by temps. as low as 23° F, but were injured at temps. below 21°.—W. N. Sparhawk.

17647. DENOGA, NORBERTO. Germination of teak.

Philippine Jour. Forest. 2(2): 173-183. 1939.—To discover methods of improving the germination of teak seed, seed treated in various ways were sown at depths of 1-12 cm. in several mixtures of soil and other materials. results were attained with mixtures of ash and clay loam in ratios of 1:2 or 1:5 and the best depths were under 6 inches. Seed buried 20-60 days in a shaded pit germinated better than that treated in other ways.—W. N. Sparhawk.

17648. FRÖHLICH, JULIUS. Zur Eichenfrage in Sieben-bürgen-Rumänien. Forstwiss. Centralbl. 61(13): 422-428. 2 fig. 1939.—Largely as a result of clear-cutting, oak has practically disappeared from much of the forest area of the Siebenbürgen and other parts of Rumania. Natural reproduction cannot be relied upon to maintain it in the forest. Some success has been had with sowing acorns in small openings, after hacking the soil. The diam. of these openings is about 3 the height of the surrounding trees. The openings are gradually enlarged and survival of oak seedlings is insured by means of repeated cleanings and release cuttings.—W. N. Sparhawk.

17649. FRÖHLICH, JULIUS. Zur Frage der natürlichen

Sparhawk.

Verjüngung der Fichte. Wiener Allg. Forst- u. Jagdztą. 57(30): 203-204. 1939.—In its native habitat in the E. Carpathian Mts. spruce reproduces freely. The direction in which cutting progresses has no definite influence on abundance of reproduction. Moderate grazing by cattle or sheep favors growth of the young spruce by removing competing grass and herbage. As full overhead light is essential, shelterwood systems are unfavorable. The mountain spruce suffers less damage from wind than that in the lowlands and foothills. Clear-cutting and planting are not good practice for spruce in this region.—W. N.

17650. HANSEN, H. L., and H. SCHMITZ. A resurvey of the demonstration prairie shelterbelts in Minnesota. Minnesota Agric. Exp. Sta. Bull. 337, 1-16, 11 fig. 1938.— The shelterbelts, now 14 yr. of age and exposed to a period of severe climatic conditions, had suffered serious losses but certain species had withstood the trials much better than others. Available soil moisture was the most important limiting factor in survival. The 4 most successful spp.green ash, boxelder, American elm, and caragana—showed an average of 45% or more of survival, with the green ash and boxelder approximating 70%. Green ash is recommended as the most satisfactory species of all tested. The tops of boxelder, willow, and, to some extent, American alm, were killed back during the severe drought. The evergreens showed a significantly lower survival on heavy lay soils than on lighter soils of a sandy nature. A total of 8 of the 64 shelterbelts examined were in need of light hinning, although none was seriously overcrowded. Two mportant causes of poor growth were grazing and a lack if adequate culture and care. In some cases tenant operaion was a factor in the poorer results. In some localities abbits caused considerable damage, especially to Scotch ine and Chinese elm. by girdling the trunks and killing he lower branches.—Courtesy Exp. Sta. Rec.

17651. HARTIG, ROLF DITFURTH. Die Forstwirtschaft üdafrikas. Zeitschr. Weltforstwirtsch. 6(10): 661-748. 6 taps, 16 pl. 1939.—An account of the forest resources of ne Union of S. Africa, the development of forestry and rest policy, and the major forestry problems. The princial indigenous and exotic trees are listed, with brief notes a the more important spp.—W. N. Sparhawk.

17652. KISS, FERENC. Szeged erdészete. [Forests of the city of Szeged.] [With Eng. summ.] Brdészeti Lapok 3(3): 260-281; (5): 500-512; (6): 619-634; (7): 745-759; 5): 823-836. 1939.—This is an account of the history of the forests of the city of Szeged, Hungary, which is situated a the sandy lowlands between the Danube and the Theiss

rivers. Afforestation was started in the 18th century, but without marked success until after 1863. Since 1884 the without marked success until after 1863. Since 1884 the forest has been managed by the State.—W. N. Sparhawk.

17653. LAWRENCE, A. O. Notes on Eucalyptus obliqua (messmate) regrowth forests in central Victoria. Australian Forestry 4(1): 4-10. 1939.—This, the first sp. of Eucalyptus known to science, has been an important commercial timber for about 100 yrs. Probably no virgin stand of commercial value remains in central Victoria. Natural regeneration following partial cutting was generally killed by fire, so that existing 2d-growth stands are generally even-aged and date from the last cutting in each area. The oldest is 65 yrs. old. Some of the forests are now in their 4th rotation. Regeneration after the 1st cut was mostly of seedling origin. but that coming later was mostly coppice. Seedlings establish themselves freely in openings made by cutting individual trees. Seed dispersal is very limited. Dense reseeding follows heavy burning of logged areas or seed-bearing stands. Burning creates a favorable seed-bed and releases the seed. After the seedling stage messmate is one of the most tolerant eucalypts of Victoria. Mature trees are intolerant of mechanical interference, and when 2 crowns touch the branchlets die back at the point of contact. Thinnings are essential if large trees are to be grown.—

W. N. Sparhawk.

17654. LIDL, O. Pilzwachstum, Baumwachstum und
Nutzung der Pilze zu Ernährungszwecken. Forstwiss. Nutzung der Pilze zu Ernährungszwecken. Forstwiss. Centralbl. 61(12): 361-370. 1939.—The question whether edible fungi from forests can be relied upon for an increased supply of food is examined. The practicability and economic feasibility of growing most of the important edible spp. are doubtful. Most of them form mycorrhizas which are important for the health of the forests. Although much larger quantities of fungi can be collected than hitherto, care should be taken not to eradicate them, and inedible spp. should not be destroyed, for many of these also form mycorrhizas.—W. N. Sparhawk.

17655. MABESA, CALIXTO. The yield of bark of

pototan and bakauan and the relation of its green weight to the volume of wood. Philippine Jour Forest. 2(2): 93-119. 1939.—A statistical study of yields of green bark of the mangroves Rhizophora apiculata and Bruguiera gymnorrhiza, used for cutch.—W. N. Sparhawk.

17656. NEMEC, ANTONÍN. Über die Kompostdüngung

der Fichte in Waldbaumschulen. Forstwiss. Centralbl. 61 (13): 406-421. 1939.—Fertilizer expts. in forest nurseries showed that influence of compost on growth and nutrition of spruce seedlings depends on the chem. composition of the soil, especially its acidity and its content of soluble mineral salts. Best conditions for growth of spruce can be created by providing not only N, K, P, and Ca, but also the other minerals that are lacking.—W. N. Sparhawk.

17657. PERRY, D. H. The effect of superphosphate on Pinus pinaster. Australian Forestry 4(1): 12-14. 1 pl. 1939. Planting of P. pinaster on dune sands on the coastal plain of Western Australia was commenced in 1926. Some untreated trees were only 18-24 inches tall after 12 yrs. Application of superphosphate at the rate of 2 ounces per tree at regular intervals (every 3 yrs. for the 1st 15 yrs.) has enabled the trees to reach heights of 30 feet and diams. of 5-6 inches in the same period. The development of annual rings of the trees shows close relation with the application of fertilizer.-W. N. Sparhawk.

17658. POHL, FRANZ. Über eine alljährlich blühende Waldkiefer. Forstwiss. Centralbl. 61(12): 389-391. 1 fig. 1939.—Several observers have reported individual pine trees (P. silvestris and P. montana) that bore & flowers every yr. and consequently showed a peculiar whorled appearance of the foliage. Pohl reports a similar *P. silvestris* from southern Tyrol. He favors distinguishing the vars. P. s. v. monticola and P. m. v. equisetiformis, proposed by Schroeter and Beissner, respectively.—W. N. Sparhawk.

17659. PRYOR, L. D. The bush fire problem in the Australian Capital Territory. Australian Forestry 4(1): 33-38. 1939.—The vegetation and climate of the Territory are descr. The fire problem is most acute in the western, mountainous portion, where the prevailing sclerophyllous vegetation (eucalypts) is steadily deteriorating in composition and quality—W. N. Sparhawk.

17660. ROHMEDER, E. Die Überwindung von Keim-

hemmungen bei den Samen der Weimutskiefer, Duglasie und Lärche durch Kaltnassvorbehandlung. Forstwiss. Centralbl. 61(13): 393-406. 2 fig. 1939.—Pinus strobus seed stored 4 weeks in moist sand in a cool cellar germinated much more quickly than seed tested without such pretreatment. The germ. % was also considerably greater. Germination was practically completed within 60-70 days after start of the test (including the storage period). By the use of this method the time required for germ. tests of white pine seed can be reduced from the usual 90 days to 60-70 days. Similar pretreatment did not hasten germ. of Pseudotsuga taxifolia; in many tests it reduced the final germ. %. Soaking in water for 24 hrs. resulted in better germ. Cool, damp storage of Larix decidua seed had no effect on germ. %.—W. N. Sparhawk.

17661. STOATE, T. N. Stem distributions in irregular forests. Australian Forestry 4(1): 23-28. 3 fig. 1939.—The distrib. of stems by girth classes and the % of crown class occupied by the various girth classes in Eucalyptus marginata forests of Western Australia were investigated. The number of stems in girth classes 80-110 inches was considerably greater than the theoretical number calculated on the basis of crown-spread: girth ratio, and these middle girth

classes occupied a larger proportion of the total crown space than the smaller or larger trees. In cutting, some trees above 90 inches' girth should be left for growing stock. These are mostly immature and will put on a large increment in the

nostly immature and will put on a large motion next 30 yrs.—W. N. Sparhawk.

17662. WECHEL, A. te. Verdere gegevens over de duurzaamheid van heiningpalen. [Durability of fence posts.]

Nederland. Boschbouw-Tijdschr. 12(9): 341-351. 2 fig. 1939. —A progress report on tests of some 15 woods set as fence posts in 1926.—W. N. Sparhawk.

17663. ANONYMOUS. Die Förderung der forstlichen Forschung. Schweiz. Zeitschr. Forstw. 90(7/8): 223-230. 2 pl. 1939.—The Swiss Forest Research Institute was founded in 1885. Early research was largely in the field of forest management, but since 1919 the need for attention to harvesting and utilization of timber products has been recognized. In forest management, emphasis should be on quality rather than on volume production. Much of the utilization and products research can appropriately be carried on by other existing agencies, but the Forest Research Institute should serve as a clearing house in order to avoid duplication and coordinate work in the related fields.—
W. N. Sparhawk.

PHARMACOGNOSY AND PHARMACEUTICAL BOTANY

HEBER W. YOUNGKEN, Editor

(See also in this issue Entries 16157, 16312, 17390, 17593, 17598, 17884)

17664. BUEHRER, T. F., C. M. MASON, and J. A. CROWDER. The chemical composition of rayless goldenrod (Aplopappus hartwegi). Amer. Jour. Pharm. 111(3): 105-112. 1939.—A chemical study of A. hartwegi was made, including a successive extraction and proximate determination of the resins, essential oils, alkaloids, rubber content and other ordinary plant constituents.—H. N. Glassman.

17665. COUCH, JAMES FITTON. Lupine studies. XIII. Octalupine. A new alkaloid from Lupinus sericeus var. flexuosus, C. P. Smith. Jour. Amer. Chem. Soc. 61(6): 1523-1524. 1939.—Lupinus sericeus var. flexuosus contains 0.53% of alkaloids, the principal base being octalupine.—H. N. Glassman.

17666. CRAIG, LYMAN C., and WALTER A. JACOBS. The veratrine alkaloids. V. The selenium dehydrogenation of cevine. Jour. Biol. Chem. 129(1): 79-87. 1939.—In connection with the elucidation of the structure of cevine a study of dehydrogenation with Se was made. The products cevanthridine and cevanthrol, first isolated by Blount and Crowfoot (Jour. Chem. Soc. [London], 1935, 1936), were obtained as well as a number of other substances. Among the more volatile reaction products were found β -picoline, 2ethyl-5-methylpyridine and a base with the formula C.H.ON. These products are shown to be compatible with the octahydropyridocoline structure previously proposed by the authors. In the Se melt was found cevanthridine, C₂₂H₂₈N, cevanthrol, C₁₇H₁₆O, a base, C₂₆H₂₆N? Mp. 229-230°, a base, C₂₆H₂₆N? Mp. 186°, a hydrocarbon, C₁₇H₁₆? Mp. 138-144°, and a hydrocarbon, C₁₈H₁₈ Mp. 116-118°.—L. C. Craig.

17667. GLASER, ERHARD, und ROBERT DROBNIK. Beiträge zur Kenntnis der Wirkstoffe des Knoblauchs. Arch. Exp. Path. u. Pharmakol. 193(1): 1-9. 1939.—Garlic, which may be classed as a peroxidase plant on the basis of its enzymic reactions, contains of and 2 hormones in physiologically equi-potential amts. Among the enzymes of garlic O2 acceptors and H₂ donors were present capable of active interactions. Catalase content was high. Probably this was of particular importance for the energetic effects, upon biooxidation. Hence claims for anticancerous and antisclerotic activity of garlic would appear to have some support. In

connection with the clinical findings of an activity of garlic in infectious intestinal catarrh, it was noted that not only the bactericidal power of the garlic oil, but also the hormones, vitamins and enzymes present, probably contributed to, or might be, the chief cause of this activity. Drug preparations made from garlic ought to contain not only the garlic oil but also the biocatalytic hormones, vitamins and enzymes of the plant,-C. S. Leonard.

17668. KLAGES, FRIEDRICH, und RAIMUND MAUREN-BRECHER. Die Konfiguration des Steinnuss- und Salep-Mannans und über den Gültigkeitsbereich der Hudson'ischen Superpositions regeln bei Mannose derivaten. 4. Über Mannane. Justus Liebig's Ann. Chem. 535(2): 175-204. 4 fig.

17669. KOZŁOWSKI, ANTONI. On the presence of photoxan in the urine of herbivora. [In Pol. with Eng. summ.] Acta Soc. Bot. Polon. 15(2): 227-231, 1938.—The urine of some herbivora which were fed on fresh, green Vicia cracca and Cichorium intybus contained unchanged photoxan. The presence of the latter can be detected by means of some oxidizing agents, e.g., of K₂Cr₂O, FeCl₃, I and ammonium persulphate respectively in the presence of H₂SO₄; a rose-red pigment, thus obtained, can be extracted from the liquid by means of amyl alcohol. The glucosides of photoxan which are present in fresh plant tissues become hydrolized in the alimentary tract, the aglucone passes into the blood system, and is finally eliminated with the urine. Since photoxan does not undergo any essential changes in the organism of herbivora, and preserves its strong reducing properties, it is probable that it takes part in certain oxidizing-reducing processes during its migration through the blood system.—F. A. Gilbert.

17670. VIEHOEVER, ARNO, and ISADORE COHEN. Physiological evaluation of veratrum viride and Veratrum album. I. Toxicity. Amer. Jour. Pharm. 111(3): 86-104. 1939. -The degree of impairment of the locomotion of Daphnia magna was used to evaluate the comparative toxicity of preps. of V. viride and V. album. The use of D. magna was checked with toxicity tests on the rat, guinea pig and rabbit. Prepns. of V. album are 21-10 times as potent as prepns. made from V. viride.—H. N. Glassman.

PLANT PHYSIOLOGY, BIOCHEMISTRY, AND BIOPHYSICS

F. E. DENNY, Editor

(See also in this issue Entries 16151, 16168, 16178, 16179, 16180, 16185, 16243, 16305, 16312, 16344, 16356, 16361, 16386, 16999, 17401, 17423, 17431, 17435, 17458, 17493, 17551, 17569, 17577, 17578, 17581, 17583, 17586, 17591, 17595, 17596, 17619, 17628, 17632, 17634, 17637, 17639, 17642, 17647, 17668, 17797, 17798, 17799, 17800, 17803, 17808, 17818, 17849)

ABSORPTION, NUTRITION

17671. ARNON, D. I., and P. R. STOUT. Molybdenum as an essential element for higher plants. Plant Physiol. 14(3): 599-602. 1 fig. 1939.—A distinct mottling of leaves followed by marginal necrosis and a characteristic involution of the laminae, accompanied by abscission of blossoms was manifest at various seasons of the year in 6 successive expts., in which young tomato plants were grown in specially purified nutrient solns. supplied with N, P, K, Ca, Mg, S, Fe, B, Mn, Zn and Cu. Development of these deficiency symptoms was prevented by adding 1 part of Mo to 100,000,000 parts of nutrient soln., with or without additions of 19 other ele-ments, none of which were capable of replacing Mo. Recovery and resumption of normal growth by molybdenum-deficient plants was also brought about by spraying their foliage with a dilute solution of molybdic acid (0.05 ppm. Mo). Ordinary distilled water and C.P. chemicals contained molybdenum as a contaminant in amounts adequate, at times, to supply plant needs.—Authors.

17672. DOBROUNOF, L. G. Critical periods in mineral nutrition of plants. Compt. Rend. (Doklady) Acad. Sci. URSS 19(3): 215-218. 1938.—From expts. on the effect of various mineral nutrients on hemp at various stages of development, it is concluded: (1) In the individual development of a plant, there is a long period during which a given nutrient exerts its influence. This period, here called "the period of the effective action of the factor on the industrially valuable products" (e.g., fibre and seed), may differ in the vegetative and reproductive organs. Beginning when the hemp plant is 6-12 days old, it lasts (in relation to the fiber) in of plants 22-28 days (i.e., until the beginning of flowering) and in 2 plants 32-38 days (i.e., until flowering is complete).

—(2) Within the above-mentioned period, there exists a short critical period during which the mineral nutrition exerts its greatest influence on the direction and intensity of development (vegetative and reproductive). In σ plants this period is 4-5 days before the buds are completely formed, while in Γ plants it is the 8-10 days at the beginning of flowering.—(3) At the beginning of the "period of effective action" is the stage when the plant is passing from nutrition at the expense of the seed to independent root nutrition. This "stage of liberation from the influence of the seed" asts 4-6 days and begins when the plants are 6-8 days old. The relation of these findings to fertilizers and their appliation is discussed.—Oran Raber.

17673. MEHLICH, ADOLF. Growth of Cunninghamella Slakesleeana as influenced by forms of nitrogen and phoshorus under varying conditions. Soil Sci. 48(2): 121-133. 939.—Sand cultures were buffered at different pH values y means of H- and K-saturated bentonites and natural entonites. The nitrate form of N promoted growth equally ell over the whole range of reaction; the ammonium form, rea and calurea produced good growth above pH 5 but ppreciably less growth with increasing acidity. Arginine and lutamic acid tended to promote least growth near the pH alues of their isoelectric points; glycine, aspartic acid and paragine gave a maximum growth over the whole range of action. Cystine was poorly utilized. Water-soluble phosnates promoted growth equally well over a wide range of action (pH 2.9 to pH 8.6). The utilization of slightly luble or water-insoluble phosphates varied with reaction, id fairly good growth was obtained on some forms of watersoluble phosphates. Organic forms of P were utilized rgely in proportion to the ease with which they can be ineralized. Growth with water-soluble phosphates was re-iced over a wide range of reaction in the presence of 4% nonite, goethite, and aluminum oxide. Freshly precipitated uminum hydroxide reduced growth markedly at a slightly id reaction. CaCO: in considerable amts. reduced growth mificantly, but at lower concs. this effect was diminished

especially in the presence of a potassium bentonite or a soluble salt like K_2 SO₄.—A. Mehlich.

17674. MULLISON, WENDELL R. Electrodialysis of pea seeds. Plant Physiol. 14(3): 583-587. 3 fig. 1939.—Electrodialysis impairs the germination, resistanse to infection, and subsequent development of seedlings. If electrodialysis is not too prolonged, the plant is apparently able to replace the lost electrolytic material, at least in part, with that obtained from the soil. If the seeds are electrodialyzed for too long a period, they lose their viability.—W. R. Mullison.

17675. STEINBERG, ROBERT A. Growth of fungi in synthetic nutrient solutions. Bot. Rev. 5(6): 327-350. 1939.

A review of the literature (99 papers) dealing with the C. N, mineral, and accessory requirements of fungi in synthetic solution. Among several questions raised is the relation of solution. Among several questions raised is the relation of C source to N availability and the possibility that ability to fix N may be related to C supply. The suggestion is also made that the nature of the C, N, and S supplied has a direct bearing on the ability of fungi to synthesize thiamin and other accessory substances. The marked increases in assimilability of poor sources of C by admixture, or by addition of traces of accessory substances and amino acids is also discussed.—R. A. Steinberg.

17676. THOMAS, WALTER, and WARREN B. MACK. A foliar diagnosis study of the effect of three nitrogen carriers on the nutrition of Zea mays. Jour. Agric. Res. 59 (4): 303-313, 1939—Analysis of the method of foliar diagnosis of the 3d leaf from the base of Zea mays growing on field plots treated with (1) manure + lime (2) a complete fertilizer with N from (a) dried blood and (b) NaNOs at 2 levels gave the following indications:—absorption and utilization of both N and P was best and at a high level in (1). the highest yielding plot, and least and at a relatively low level in [2(a)], the lowest yielding plots; but the levels of K₂O were in inverse relationship to yields. In relation to the optimum treatment (1), the intensities of nutrition of the other treatments were too high, and with respect to the physiological ratios between the elements, as indicated by the magnitude designated "the NPK unit," N and P₂O₅ were too low compared with the optimum and K2O was too high. The mean values of the respective NPK units during the growth cycle show a definite relationship to the yields of grain.—Authors.

17677. WOODMAN, R. M. Studies in the nutrition of vegetables. Phosphate deficiency and yield tests on sand cultures of May King lettuce. Jour. Agric. Sci. 29(2): 229-248. 1 pl. 1939.—This paper describes a number of greenhouse (pot culture) tests made to ascertain the symptoms of phosphate deficiency. For culture media 8 solns, were used: A, B, C, D, E, F, G and H. A-F were all 0.01% as regards each of the following: anhydrous CaCl₂, K₂SO₄, anhydrous MgSO₄, and NaNO₃. Anhydrous disodium phosphate and anhydrous Na₂SO₄ present in meida varied from 0.00 to 0.02%. G contained phosphate alone and H was a distilled water control. To all the media including distilled water pure ferrous sulphate was added in such quantity that ½ mg. of Fe (equivalent to 2½ mg. of FeSO.7H2O) was present in one liter of culture medium.—Absence of phosphate caused bronzing of leaves and shriveling of lettuce plants. Phosphate alone produced characteristic purple (and/or bronze) and apple-green, flat, stunted rosettes with broad, non-crinkly leaves and red stalks. Water alone caused stunted, straggly, purple plants with relatively long crimson stalks. Where essential elements were supplemented by some P, normal color resulted at first: later purple blotches appeared on plants receiving inadequate supplies; intensity of colour increasing as amount of phosphate diminished. Deficiency of phosphate also caused toughening of leaves and delayed maturity.-T. D. Jarvis.

AUXINS, GROWTH HORMONES

17678. AVERY, G. S. Jr., and G. B. SARGENT. The effect of various compounds upon straight growth of the Avena coleoptile. Amer. Jour. Bot. 26(7): 548-555. 1939.—180 compounds of widely different molecular structure were tested for their ability to stimulate straight and curved growth of the Avena coleoptile. Aliphatic, aromatic, and heterocyclic compounds and some of their derivatives were tested. At the dilutions tested 37 compounds stimulated growth but only 10 of these (previously well known) induced the Avena curvature response; 27 stimulated straight growth only. 50 compounds inhibited growth and 93 others were either without apparent effect, or gave inconsistent results.—G. S. Avery, Jr.

17679. BONNER, JAMES, and J. B. KOEPFLI. The inhibition of root growth by auxins. Amer. Jour. Bot. 26(7): 557-566. 1939.—Expts. are reported on the inhibition of the and by 21 analogs of this substance. The substances to be tested for root growth inhibiting activity were made up in concs. of 10⁻³ to 10⁻¹¹ M, placed in Petri dishes containing germinated oats, and the root growth in the several solns. compared with that in distilled water after 20 hrs.—The chemical specificity of the auxin inhibition of root growth is closely similar to the chemical specificity of the auxin promotion of the growth of stems and coleoptiles. Substances that are highly active in the Avena or pea tests (such as indoleacetic, naphthaleneacetic, anthraceneacetic, phenylacetic, and cis-cinnamic acids) are also highly active in inhibiting the growth of roots; substances that are feeble in the Avena or pea tests (such as cyclohexaneacetic and transcinnamic acids) are also feeble in inhibiting root growth. Indole acetic acid is more effective in inhibiting the growth of roots in acid (pH 4) media than in media of higher alkalinity. Auxin inhibition of root growth cannot be off-set to any significant extent by supplying to the inhibited roots a superabundance of the materials necessary for root growth, such as sugar, vitamin B₁, etc. The inhibiting effect of auxin seems to be directly upon the individual cells of the root rather than upon the mobilization or transport of other substances.—J. Bonner.

17680. ČAJLACHJAN, M. CH., and L. P. ŽDANOVA. Hormones of growth in formation processes. I. Photoperiodism and creation of growth hormones. Compt. Rend. (Doklady) Acad. Sci. URSS 19(1/2): 107-111. 2 fig. 1938.—From expts. on a variety of plants, it is concluded that in both short-day and long-day plants, the formation of growth hormones is more intense under long-day treatment. Since bud and flower formation are not affected, the rôle of the hormones (auxins) is confined to growth processes.—Oran Raber.

17681. ČAJLACHJAN, M. CH., and L. P. ŽDANOVA. The role of growth hormones in form-building processes. II. Yarovization and formation of growth hormones. Compt. Rend. (Doklady) Acad. Sci. URSS 19(3): 219-224. 2 fig. 1938.—Completely iarovized seeds of cereals contain less auxin than seeds not iarovized. The longer the seeds are iarovized, the less auxin they contain. The character of these changes is identical in summer and spring vars., whereas iarovization stimulates winter vars. and has no effect on summar ones. The decrease in the amount of growth hormones in seed apparently accounts for the changes in growth which may be observed in seedlings from iarovized seed, viz., the inhibition of coleoptile growth, the shortening of the blade of the first leaves, and their epinasty. Consequently the part played by the growth hormones in iarovization phenomena is restricted to the processes of plant growth.—O. Raber.

processes of plant growth.—O. Rober.

17682. HITCHCOCK, A. E., and P. W. ZIMMERMAN.
Unusual physiological responses induced on intact plants
by capping with black cloth. Contr. Boyce Thompson Inst.
10(4): 389-398. 2 fig. 1939.—Capping the upper part of the
tomato plant with black cloth for periods of 3-14 days
induced responses such as epinasty of leaves, swelling, proliferation (including the formation of intumescences), inhibition of growth, initiation of adventitious roots, and
disturbance of apical dominance correlations. These typical
responses are similar to those induced by treatment with
applied growth substances such as indoleacetic acid, indole-

butyric acid, naphthaleneacetic acid, and ethylene in concs. of 1 to 500 p.p.m. The magnitude of the responses indicates that they were caused by an increase in the production of natural hormones and not entirely as a result of a redistribution of the existing hormones during the dark treatment. Although the premature growth of axillary buds on capped plants indicated a decrease in the apical dominance effect, other responses indicated that a marked increase in hormone production had occurred. Thus, at least a partial separation of the bud-inhibiting influence from the influence of other natural hormone effects was obtained in the capped plants.—Auth. abst.

in the capped plants.—Auth. abst.

17683. HITCHCOCK, A. E., and P. W. ZIMMERMAN.
Comparative activity of root-inducing substances and methods for treating cuttings. Contr. Boyce Thompson Inst.
10(4): 461-480. 3 fig. 1939.—Treatment of cuttings with root-inducing substances applied as dilute solns. (1-80 mg./l.), as conc. solns. (1-20 mg./cc.), and as powders (0.5-50 mg./g.) produced essentially the same rooting response. Concentration requirements for optimum rooting varied according to the kind and form of substance, the kind of carrier or solvent, the species of plant, the age and relative activity of the shoot, the time of year treatment was administered, and the method of applying the substance to the cuttings. The physical characteristics of the test powders appeared to account mainly for the differences in the effective range in conc. of 4-50 mg/g, for the coarser test powder and 0.5-12 mg/g, for the finer test powder. The conc. soln. (1-20 mg/cc.) and powder (0.5-12 mg/g,) dip methods were about equally effective on a weight basis but represent cones. 10 to 1,000 times those producing equivalent rooting according to the standard soln. method of treatment (1-80 mg/l.). K salts were consistently more effective than the acids (indolescetic, indolebutyric, and naphthaleneacetic) which appeared to be due in part to solubility relations. Indolebutyric acid or the salt was more effective on most species than indoleacetic or naphthalene-acetic acids. Talc controls exhibited better rooting than nontreated controls or tap water controls. At least part of the beneficial effect of talc appeared to involve water relations since at all times the cuttings showed less evidence of lack of water than did the non-treated or tap water controls. An ingredient of control tale, soluble in chloroform, was found to be physiologically active when tested on tomato plants. Treatment of some 70 spp. included types readily rooted, moderately difficult, and those definitely difficult to root. Varieties of Syringa vulgaris rooted in 24-39 days (50 to 100%) when treated with indolebutyric acid applied as a powder.—Auth. abst.

17684. JOHNSTON, STANLEY. The influence of certain hormone-like substances on the rooting of hardwood blueberry cuttings. Quart. Bull. Michigan Agric. Exp. Sta. 21 (4): 255-258. 1939.—Hardwood cuttings of Rubel, Pioneer, Adams and Cabot blueberries were treated with 3 concs. of auxilin and 3 of hormodin A. Together with untreated checks these cuttings were placed in German peat in solar frames for rooting. Rooting percentages of different lots varied from 50 to 100. No beneficial results were obtained from any of the treatments.—V. R. Gardner.

17685. RAPER, JOHN R. Sexual hormones in Achlya. I. Indicative evidence for a hormonal coordinating mechanism. Amer. Jour. Bot. 26(8): 639-650. 26 fig. 1939—A new heterothallic species of Achlya, A. ambisexualis, comprising the type and 2 vars., var. abjointa and var. gracilis, is described. This species is closely related to A. klebsiana. Initiation and coordination of the different stages in the sexual process of this species, as well as in A. bisexualis, is accomplished by means of diffusible sexual substances. The sequence of events, the pattern of incompatibility in the reciprocal interspecific matings between A. ambisexualis and A. bisexualis, and the effects of variations in the composition of the medium indicate that there are 4 of these substances, 2 produced by the 2 inducing specific responses in the 3 and 2 secreted by the 3 initiating specific reactions in the 9.—J. R. Raper.

17686. WENT, F. W. A case of correlative growth inhibition in plants. Amer. Jour. Bot. 26(7): 505-512. 1939.—When Avena coleoptiles are cut into short sections and these sections are immersed in auxin solutions, all sections capable

of growth will elongate. If, however, auxins are applied to the tip of an intact or decapitated coleoptile, the lower zones show a relative growth inhibition in contrast with the zones near the tip in which growth is accelerated. This inhibition is a secondary effect of the auxin, and due to a correlation. It is especially marked with phenylacetic and cis-cinnamic acid, and even hemi-auxins, such as γ phenylbutyric acid give the response. Further expts. indicate that the growth inhibition is due to a translocation of other growth factors from the inhibited regions to the zones immediately adjoining the applied auxin. This effect is closely connected with bud inhibition, in which auxin also causes a growth inhibition of the buds further away from the applied auxin.—F. W. Went.

17687. WENT, F. W. Further analysis of the pea test for auxin. Bull. Torrey Bot. Club 66(6): 391-410. 1939.—

Pea test curvatures were analyzed both for the mechanics of their appearance and for the growth reactions underlying them. When etiolated pea stems are split in the growing region and placed in auxin solns. then the outside tissues will grow more than the inner tissues near the wound, resulting in an inward curvature. This is due to the rapid loss of sensitivity for auxin of the cells near the wound. There is no innate differential sensitivity of inner and outer tissues to auxin. The effect of auxin in the pea test is resolved into a chain of 2 reactions in each of which auxin takes part. The first is the so-called preparatory reaction which can be induced by substances lacking growth activity (hemi-auxins). The growth reaction proper follows the preparatory reaction in time and only the true auxins can take part in it. Indole acetic acid gives the preparatory reaction in concs. of about 1 mg. per liter, whereas concs. of .1 mg. per liter and lower are still active in the growth reaction. The preparatory reaction precedes the growth reaction and is, in contrast with the latter, independent of pH. Based on this new knowledge a greatly improved pea test for very low auxin concs. is described.—F. W. Went. 17688. ZIMMERMAN, P. W., and A. E. HITCHCOCK.

Experiments with vapors and solutions of growth substances. Contr. Boyce Thompson Inst. 10(4): 481-508. 7 fig. 1939.— The exptl. results reported involve 54 physiologically active substances that are designated as growth substances. Of this list of compounds 28 were reported active when applied as vapors in a preceding publication. These compounds are as follows: a-naphthaleneacetic acid, methyl a-naphthaleneacetate, ethyl a-naphthaleneacetate, acenaphthyl-5-acetic acid, α -naphthylacetonitrile, l-naphthaleneglycollic acid, l-naphthaleneglyoxalic acid, α -naphthoxyacetic acid, β -naphthoxyacetic acid, β-naphthyl mercaptoacetic acid, β-naphthyl glycine, α -naphthoylpropionic acid, β -indoleacetic acid, methyl β -indoleacetate, ethyl β -indoleacetate, β -indolepropionic acid, methyl β -indolepropionate, β -indolebutyric acid, methyl β -indolebutyrate, ethyl β -indolebutyrate, indole a-methyl \beta-acetic acid, phenylacetic acid, methyl phenylacetate, ethyl phenylacetate, mandelic acid, cis cinnamic acid, and irradiated methyl cinnamate and ethyl cinnamate. 26 compounds reported for the first time are as follows: B-naphthoxyacetamid, ethyl β-naphthoxy α-butyrate, β-naphthoxy α-butyric acid, ethyl α-naphthoxy α-butyrate, nethyl and ethyl β-naphthoxyacetate, m-tolyl β-naphthoxycetate, methyl and ethyl a-naphthoxyacetate, a-naphtholavone, a-naphthylamine, a-naphthaleneacetic acid picrate, l-naphthoxyacetic acid picrate, a-naphthoxyacetic acid icrate, iso-butyl phenylacetate, butyl phenylacetate, methyl thyl phenylethylmalonate, phenylbutyric acid, phenylethylcetic acid, N-phenylglycine ethyl ester, irradiated methyl α -nitrocinnamate, methyl α -trimethylamino- β -(3-indole) ropionate iodide, ethyl α-bromoacetoacetate, homopiperoilic acid, nicotinic acid nitrate, and pimelic acid. The sponses induced with growth substances concerned in this aper are of a formative nature usually affecting particular rgans or parts of a plant, differing in this respect from rtilizers. Downward growth of leaves, enlarged stem tips, ositive geotropism of horizontal stems, hypertrophies, arthenocarpy, and induced adventitious roots are examples formative effects, which are referred to as induced abornalities. There are many qualitative differences in sponses induced by the 54 substances, but they have in muon the capacity to induce epinasty of tomato leaves. Il chemical compounds which have the capacity to induce

epinasty of tomato leaves similar to that induced by ethylene gas have been called "growth substances." Through the use of motion pictures, it was shown that after exposure to vapors of methyl a-naphthaleneacetate, tomato plants responded in 20 min., and tobacco plants in 30 min. Plants treated with vapors of the more active growth substances gave off emanations which affected other plants standing near. When treated and then removed to a clean bell jar with a test object, both plants made pronounced responses. The influence of growth substance vapors on rate of metabolism was studied by measuring the CO₂ evolved when plants were in the dark. During the first hour after exposure the treated plants produced less CO₂ than controls, but for the next 5 hrs. they exceeded the controls. By exposure to vapors of growth substances many species of plants were induced to form adventitious roots on leaves, stems, roots, and cuttings. Phenyl growth substances applied in vapor form broke the rest period of dormant potatoes in contrast with the naphthalene substances which inhibited bud growth. Vapors of methyl and ethyl a-naphthaleneacetate caused parthenocarpic development of holly berries, ovaries of fuchsia, and enlargement of the receptacle of strawberries. Hybrid orchid flowers grew downward when exposed to vapors as if naturally pollinated, and there were indications of seed-pod development without pollination. The petals of treated holly flowers and buds remained in good condition for 45 days in contrast to a few days for controls. The ovaries developed without opening of the buds. naphthalene substances were more effective than indole and phenyl compounds for inducing parthenocarpy. Vapors of growth substances applied to etiolated pea and Windsor bean seedlings induced abnormal geotropism, retardation in rate of elongation, swelling of stems (especially the tip in peas), and adventitious roots on stems and roots. Coleoptiles of etiolated oats and corn seedlings showed abnormal elongation when exposed to the vapors under light or dark conditions. The first leaf broke through the coleoptile of controls shortly after being exposed to light. The leaves remained inside the coleoptile of treated plants for 48 hrs. or more while in light.—Auth. abst.

PROTOPLASM

17689. FREY-WYSSLING, A. [Micellar concept.] Chron. Bot. 5(1): 9, 10. 1 fig. 1939.—A presentation of the modified micellar theory of Nägeli proposed by the author which looks upon the micellae present in organized biological substances as bound together in a netlike structure by interconnecting molecular strands in a manner which conditions the infiltrability, stainability, and permeability, as well as the mechanical and optical properties of such substances. This conception is held to apply probably to the submicroscopic structure of protoplasm and its derivatives such as starch, cellulose, chitin, silk fibroin, keratin, collagen, muscle myosin, etc.—Courtesy Exp. Sta. Rec.

OSMOSIS, PERMEABILITY

17690. KNODEL, HANS. Über die Abhängigkeit des osmotischen Wertes von der Saugkraft des Bodens. Jahrb. wiss Bot. 87(4): 557-564. 1939.—Expts. carried out with young oat plants in soil containers, showed that the osmotic conc. of the shoot tissues depended on the water content of the soil. The plants were dried and part of dried material used for determination of the osmotic value by adding sufficient water to restore to the original fresh weight and then determining cryoscopically the osmotic conc. of the expressed sap. Besides the water content other factors influenced the osmotic value, thus with increasing supplies of K the osmotic value increased in soils in which water content remained constant. Normal shoot development occurred if the above ground parts of the plant maintained an osmotic conc. some 5-6 atmospheres above that of the soil soln.—J. H. Priestley.

17691. NORTHEN, HENRY T., and REBECCA T. NORTHEN. Effects of cations and anions on protoplasmic elasticity. Plant Physiol. 14(3): 539-547. 1939.—The centrifuge method was used to determine the effects of various cations, anions, and mixed cations on the elasticity of the protoplasm of Spirogyra. The univalent cations Li and Cs decreased protoplasmic elasticity, while Na and K increased it. Of the divalent cations, chemically related Ca, Sr, and

Ba decreased elasticity, whereas chemically related Be, Mg, Zn, Cd, and Hg increased it. The closely related anions Br, Cl, and I had little effect on elasticity; the sulphate, phosphate, fluoride, and chromate ions caused an increase, and the arsenate and nitrate ions a decrease. The effect of an ion in decreasing or increasing elasticity is apparently due to its chemical activity rather than to its valence. When filaments were immersed in mixtures of divalent cations, the result could not be predicted from the behavior of the individual ion; e.g., Mg, which increased elasticity, was antagonized by Ba, which decreased it; but Mg was also antagonized by Cd which individually acted like Mg.—H. T. Northen.

GERMINATION, DORMANCY

17692. BARTON, LELA V. Storage of some flower seeds. Contr. Boyce Thompson Inst. 10(4): 399-427. 7 fig. 1939.—Data are given for some flower seeds showing retention of vitality after storage for various periods up to 12 years. Dandelion (Taraxacum) seeds could be stored safely at room temp. for 3 yrs. if the moisture content was reduced to 5% or less and if the containers were not opened until the end of the period. If the containers were opened as often as every 6 months it was necessary to reduce the moisture content to as low as 3.9% at the beginning of the storage period in order to keep the seeds viable for 3 yrs. Sealed storage proved superior to open storage regardless of moisture content (up to 7.9%) when room temp. or 5° C was used. Seeds kept perfectly at —5° C for the 3-yr. period regardless of sealing or moisture content. Similar trends in behavior were found for seeds of aster (Callistephus) and Verbena stored in the same manner as those of dandelion. Sweet pea (Lathyrus), pansy (Viola), and Venidium seeds remained viable for 3 yrs. under favorable storage conditions. Seeds of the regal lily (Lilium regale) were kept fully viable for at least 6 yrs. under conditions of dry, cold storage. Air-dry seeds of annual and perennial Delphinium retained their original germination power unimpaired for 143 months of sealed storage at 8° C and —15° C, respectively. Furthermore, normal seedlings were produced from these old seeds.—Auth. abst.

17693. DENNY, F. E. Respiration of gladiolus corms during prolonged dormancy. Contr. Boyce Thompson Inst. 10(4): 453-460. 2 fig. 1939.—Gladiolus corms maintained in a dormant condition for 5 to 18 months by being replanted in moist soil soon after harvest and being stored in a moist condition at room temp. showed a low rate of CO₂ production during the first 4 hrs. after removal from the soil. Thereafter the respiration rate rose and reached a maximum about 20 hrs. later, at which time the increase in CO2 output was found to be 5-fold, 10-fold, 30-fold, or even larger. The rate then decreased until after about 5 days it approached but did not reach the low values shown by the corms at the time of removal from the soil. If replanted in the soil the respiration rate again returned to low values, and if this 2d sojourn in the soil was only about 4 to 6 weeks before the corms were again removed for a respiration test, the large gain in respiration during the 24-hr. period after removal from the soil so characteristic of the corms on the first test did not occur in the 2d test. However, when the sojourn was as long as 3 months the large gain in respiration was again observed. These changes in respiration rate were obtained without change in temp. Corms whose respiration had been increased many-fold at some stage of the tests when replanted in soil did not sprout, but contained to maintain their dormant condition.—Auth.

17694. HUELIN, F. E., and J. BARKER. The effect of ethylene on the respiration and carbohydrate metabolism of potatoes. New Phytol. 38(2): 85-104. 9 fig. 1939.—A detailed study has been made of the effect of ethylene on the production of CO₂ and the sugar content of tubers of King Edward potatoes at 15° C after varying periods of storage. Increases in respiration were obtained in concs. of 1 ppm of ethylene. Continued storage increased the effect of ethylene. Respiration increase, but little sugar content increase, occurred early in the storage period. Later, both were increased by the ethylene. Ethylene had no effect on potatoes of high sugar content, which had been sweetened at plus 1° C. Potatoes will slowly recover their ability to

respond to further treatment after an ethylene treatment. It is suggested that ethylene causes a lowering of the "organization-resistance," resulting in changes in the "respiratory efficiency" and the starch-sugar equilibrium which are similar to those occurring in senescence.—J. R. King.

17695. PFEIFFER, NORMA E. Life of gladiolus pollen prolonged by controlled conditions of storage. Contr. Boyce Thompson Inst. 10(4): 429-440. 2 fig. 1939.—The pollen of most vars. of Gladiolus shows greatly reduced vitality within 2 days if stored under room conditions of temp., humidity, and light. The life of Gladiolus pollen was prolonged to 8 or 10 weeks by storage in the dark at 10° C in a humidity controlled by a saturated soln. of K₂CO₈ or in 50% humidity controlled by a H₂SO₄ soln. Good results were also obtained from storage in the dark over saturated solns. of MgCl₂ and CaCl₂ at 10° C. Pollen kept under room conditions for 2, 4, or even 6 days depending upon the variety was found to recover its ability to function when placed in an atmosphere with 65% humidity at 10° C. Viability was tested by means of pollinations and capsule and seed production. Seed produced by pollination with pollen stored for various intervals from 10 to 102 days gave a good stand of strong seedlings.—N. E. Pfeiffer.

17696. THOMPSON, ROSS C., and WILLIAM F. KOSAR. Stimulation of germination of dormant lettuce seed by sulphur compounds. Plant Physiol. 14(3): 567-573. 1 fig. 1939.—Certain sulphur-bearing compounds including thiourea, thiosemicarbazide, thioacetamide, allyl thiourea, ammonium thiocyanate, and potassium thiocyanate in weak aqueous solns. (0.5%) stimulated the germination of dormant lettuce seed at temps. above 25° C. Thiourea was the most generally effective on numerous lots of dormant seed. The rate of growth of the chemically treated embryos was much slower than in the check lots germinated in water. The presence of S in a specific linkage appears to be the important factor.—Authors.

17697. THORNTON, NORWOOD C. Development of dormancy in lily bulbs. Contr. Boyce Thompson Inst. 10 (4): 381-388. 1 fig. 1939.—Lilium longiforum bulbs stored in soil under conditions limiting aeration develop partial dormancy and when planted in soil these bulbs produce either no growth or very slow-growing undersized plants with abnormally deep green foliage characteristic of dwarfed plants. Storage of the bulbs in soil under conditions providing for aeration or in containers supplied with O₂ eliminated the problem of dormancy since the plants grew rapidly to a good height and produced a satisfactory number of flowers. Bulbs harvested late in the season and stored in soil in an open container for a short period of time renewed growth and produced flowers sooner than bulbs harvested earlier in the season and stored in the same manner for a longer period of time.—Auth. summ.

period of time.—Auth. summ.

17698. ZARUBAILO, T. J. Response of unripened wheat grain to yarovization—effect of chilling. Compt. Rend. (Doklady) Acad. Sci. URSS 19(1/2): 103-105. 2 fig. 1938.—Chilling of unripe seed for 30 days produced the same effect as growing seeds at low temp. Hence it may be inferred that in the latter case the low temp. affects the forming and ripening seeds directly and not through the mother plant. It was also shown that not only germinating seeds but also unripe seeds are able to pass the stage of iarovization from the middle period of ripening.—O. Raber.

GROWTH, DEVELOPMENT

17699. BUSSMANN, KURT. Untersuchungen über die Induktion der Dorsiventralität bei den Farnprothallien. Jahrb. wiss. Bot. 87(4): 565-624. 1939.—In the 3 fern families investigated (Polypodiaceae, Parkeriaceae and Osmundaceae) the young prothallium grows by a wedge-shaped 2-sided apical cell. Such a cell arises also when, as especially in Adiantum cuneatum, as the result of the failure of some external factor, successive cell divisions in the protonema follow anomalous courses and cell masses arise. The orientation of this apical cell in the Polypodiaceae and Ceratopteris prothallia, in clear daylight, is detd. solely by gravity; when in the former the sides are parallel to the vertical, in the latter at right angles. If the light is deficient, however, the direction of incidence influences the orientation, when in the Polypodiaceae the sides of the cell tend to lie parallel to its direction, in Ceratopteris at right angles, to its

mall root observation boxes (24 × 17 × 7 inches) din 2 trials for the observation of the effect of exposing apple rootstocks, unworked Malling Nos. I and roots were shielded from direct sunlight. The roots her always uncovered, exposed for 20 min. 3 times exposed for 2 hrs. once a fortnight, or kept in total. The results showed no marked negatively heliosponse. Continuous exposure to daylight checked with and the development of lateral roots, but suberization. 20 min. to 1 hr. exposures caused growth checking. Exposures for 30 min. weekly nificant during early summer when the light invas high, but not significant in late summer and fall. Overholser.

RESPIRATION

KIDD, FRANKLIN, and CYRIL WEST. The ng influence of carbon dioxide. VI. The effect of ion of oxygen and of carbon dioxide in the atmoson the course of chemical change in stored apples. ytol. 38(2): 105-122. 8 fig. 1939.—This is a report fluence of O₂ and of CO₂ on the progressive changes composition that take place during the storage e Bramley's Seedling apples after gathering. The believe that each of the 3 main fractions of the upple—(a) the starch and sugar fraction, (b) the isoluble fraction excluding starch, and (c) the acid probably contribute to the loss of C in respiration. Sion of both O₂ and CO₂ affects the drain on these. O₂ tension has little effect on the rate of hydrolysis; CO₂ increases the rate of sucrose hyput decreases the rate of hydrolysis of the alcoholfraction. A fructosan is considered to exist in ol-soluble fraction. The behavior of the starch + ition is anomalous, and sugar must be both passing produced from the undetermined fraction during f the fruit. A sharp contrast exists between the at 1° and 5° C as regards the alcohol-soluble ined fraction. Fructose units are produced during lysis of starch which is connected with this process. of analysis are given in the appendix.—J. R. King.

METABOLISM, GENERAL

WOOD, J. G., and B. S. BARRIEN. Studies on ur metabolism of plants. I. Preliminary investing the effects of different external concentrations the, ammonia and cystine on the amounts of ontaining compounds in leaves. New Phytol. 38 149.5 fig. 1939.—This paper describes an investito the relations that existed in the leaves of ong the amounts of S compounds when the plants ected to different treatments under certain convents of the conditions. The treatments consisted to desages of K.SO., NH.Cl and cystine applied to the plant. Following certain chemical changes related to the presence of these substances, it is that ammonia N acts as a limiting factor in tion of protein S from sulphate, and a schema of for the probable sequence of reactions in S analytical methods for the determination of fractions are described.—J. R. King.

CARBOHYDRATE METABOLISM

CIDD, FRANKLIN, and CYRIL WEST. Formaiructose" units 'during hydrolysis in the later
he growth of the apple. New Phytol. 38(2): 123.
ort report, mainly in the form of a table, on the
omposition of Bramley's Seedling apples during
d periods of fruit development.—J. R. King.
KROTKOV, G. Carbohydrates of wheat leaves.
siol. 14(3): 559-565. 1939.—Following alcoholic
of Marquis wheat leaves in the stage of early
he residue liberated sugars after being hydrolyzed
IPO4, digested with trypsin and, finally, after
with 1% H₂SO4. The union between the comrts of at least a portion of the carbohydrateaplex is evidently of such a nature that it is not
yn on digestion with 1% H₂SO4, and sugars can
from such a complex only after tryptic digesprotein fraction.—G. Krotkov.

17720. LEONARD, O. A. Carbohydrate transformations in leaf blades, with special reference to sucrose synthesis. Amer. Jour. Bot. 26(7): 475-484. 1939.—Corn leaf blades, placed with their bases in 6% glucose, increased with time markedly in sucrose, but only slightly in glucose. Cotton and sorghum leaf blades increased markedly in sucrose when fed 6% glucose, fructose, maltose and lactose; slightly from cellobiose and d-galactose, and none from d-mannose, l-xylose, l-arabinose, dulcitol, manitol and sorbitol. Cotton blades synthesized more sucrose from glucose before the cotton harvest (Sept. 10) than afterwards (Oct. 1). Sucrose was not formed from glucose in sorghum blades which were placed in N₂ or CO₂ atmosphere. Apparently aerobic respiration is related to the formation of sucrose. Iodoacetic acid in conc. of 0.1% or higher prevented the formation of sucrose but not its hydrolysis. Cabbage blades on drying synthesized large quantities of sucrose from the reducing sugars and starch. This synthesis continued until the blades had reached a moisture content of 8% but was prevented by heating at 72°C. Various strengths of KCN, NaCN, KSCN, ethyl ether fumes and invertase had little influence on sucrose formation.—O. A. Leonard.

NITROGEN METABOLISM

17721. DAWSON, RAY F. Influence of certain amino acids and of nicotinic acid upon the nicotine content of tobacco leaves. Plant Physiol. 14(3): 479-491. 1939.—Excised shoots of Connecticut Broadleaf and of Havana Leaf tobaccos were cultured for periods ranging from 2 to 4 days in dilute solns. of various substances. Of these, pyrrolidonecarboxylic acid, proline, nicotinic acid, and sometimes glutamic acid significantly increased the nicotine content of the leaves. Picrates of the steam distillates were prepared from each exptl. sample of leaf material, and melting points were taken to determine whether or not the observed increases in volatile alkaloid content were due to nicotine itself. The relative order of effectiveness of each of these compounds was glutamic acid < pyrrolidonecarboxylic acid < proline and nicotinic acid. NaMg chlorophyllin, glycine, d-arginine monohydrochloride, d-glucose, citric acid, and dl-a-amino-n-valeric acid had no effect on nicotine synthesis.—R. F. Dawson.

PROTEIN METABOLISM

17722. WEINSTOCK, HARRY H. Jr., HERSCHEL K. MITCHELL, ERNEST F. PRATT, and ROGER J. WILLIAMS. Pantothenic acid. IV. Formation of β -alanine by cleavage. Jour. Amer. Chem. Soc. 61(6): 1421-1425. 1939.—Pantothenic acid appears to be synthesized by yeast only when β -alanine is furnished in the culture medium. Several lines of evidence indicate that β -alanine is a cleavage product of pantothenic acid.—H. N. Glassman.

17723. WHITE, PHILIP R. Glycine in the nutrition of excised tomato roots. Plant Physiol. 14(3): 527-538. 1939.— Addition of 3 mg. glycine per liter of a soln. containing mineral salts, sucrose, and thiamin in optimal proportions provided a nutrient soln. capable of supporting growth of excised tomato roots equal to that obtained in any nutrient soln. previously studied including those containing yeast extract or the 9-amino-acid mixture previously reported. Equimolecular concs. of other single amino acids, of organic acids, or of Na acetate failed to yield comparable results. Excised tomato roots are evidently able to utilize glycine as their sole source of amino N other than that synthesized from inorganic nitrate, although glycine is not a constituent of most storage proteins. The evidence gives no indication of the nutritional processes going on in the intact plant but does provide a simple and completely synthetic nutrient capable of supporting unlimited growth of excised tomato roots.—P. R. White.

PIGMENTS

17724. FISCHER, HANS, WILLY LAUTSCH, und KUO-HAO LIN. Teilsynthesen von Dehydro-bacterio-phorbid und Dehydro-bacterio-chlorin. 82. Zur Kenntnis der Chloro-phylle. Justus Liebig's Ann. Chem. 534(1): 1-22. 6 fig. 1938.

17725. FISCHER, HANS, und OTTO LAUBEREAU. Über die Teilsynthese des Meso-pyro-phäophorbids und weitere synthetische Versuche in der Chlorophyllreihe. 83.

Zur Kenntnis der Chlorophylle. Justus Liebig's Ann. Chem. **535(1): 17-37, 4938**

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17726. FISCHER, HANS, und HERMANN WEN-DEROTH. Zur Kenntnis von Chlorophyll. Justus Liebig's Ann. Chem. 537(2): 170-177. 1939.—Development of a

new structural formula for chlorophyll.—M. Neuhof.

17727. FISCHER, HANS, und MAX CONRAD. Über
Teiloxydation einiger Chlorophyllderivate. 87. Zur Kenntnis der Chlorophylle. Justus Liebig's Ann. Chem. 538(2): 143-156, 1939,

17728. FISCHER, HANS, und MARTIN STRELL. Über

Neopurpurine. 88. Zur Kenntnis der Chlorophylle, Justus Liebig's Ann. Chem. 538(2): 157-171. 2 fig. 1939.

17729. FISCHER, HANS, HELMUT MITTENZWEI, und AUGUST OESTREICHER. Über Protochlorophyll und Vinylphäoporphyrin as (Vorläufige Mitteilung). Hoppe-Seyler's Zeitschr. physiol. Chem. 257(5/6): iv-vii. 1939.

17730. NEISH, ARTHUR CHARLES. Studies on chloroplasts. I. Separation of chloroplasts, a study of factors affecting their flocculation and the calculation of the chloroplast content of leaf tissue from chemical analysis. II. Their chemical composition and the distribution of certain metabolites between the chloroplasts and the remainder of the leaf. Biochem. Jour. 33(3): 293-308. 1939.—I. A method of isolating the chloroplast substance from leaf tissue at the rate of 2-3 g. per day is descr. This method is based on the flocculation of suspensions of the chloroplast substance by cations. A study of the factors affecting the rate of flocculation shows that it cannot be explained entirely as a neutralization of electrical charges. Several methods of calculating the chloroplast content of leaf methods of calculating the chloroplast content of leaf tissue are compared; these methods are based on analysis for the plastid pigments. The results show that the completeness of extraction of these pigments is affected by unknown variables. A method based on analysis for chlorophyll gives satisfactory results.—II. Chloroplasts consist chiefly of protein and lipins. Cu, Fe, P and NH, salts are conc. to a certain extent in the chloroplasts; Ca, Mg, Mn, Na, K, and Cl, show an apposite localization in the Mn, Na, K and Cl show an opposite localization in the cell. SO₄ and NO₅ do not follow any general rule. The Cu in the chloroplasts is chiefly in organic combination. Part of the Fe and P is organically combined but Ca and Mg are present chiefly in the inorganic state. Most of the catalase in the leaf cells is present in the chloroplasts. Carbonic anhydrase and ascorbic acid are found in appreciable quantities in the chloroplasts and in other parts of the cell.—A. C. Neish.

17731. SHERMAN, W. C., and W. D. SALMON. Carotene content of different varieties of green and mature soybeans and cowpeas. Food Res. 4(4): 371-380. 1939.—The carotene content of 45 vars. of soybeans and 9 vars. of cowpeas in the green stage ranged from 212 to 705 and 140 to 231 γ per 100 g., respectively (fresh basis). Two years' crops of mature seed from 41 vars. of soybeans and 8 vars. of cowpeas ranged in carotene content from 17.5 to 243.5 and 20.8 to 41.7 γ per 100 g., respectively (air-dry basis). Excessive weathering in the field after reaching maturity caused a destruction of as much as half of the carotene of several vars. of soybeans.—Authors.

ENZYMES

17732. ROSS, A. FRANK, W. E. TOTTINGHAM, and RUDOLPH NAGY. Characteristics of the tyrosinase system in potatoes which blacken after boiling. *Plant Physiol.* 14(3): 549-557. 1939.—Press sap from frozen tubers was stored under N₂ at 0° to restrict loss of enzyme in melanin formation. Disappearance of added tyrosine was detd. colorimetrically. Tyrosinase activity of abnormal sapex-ceeded that of normal sap to a greater extent either unbuffered or in borate buffers than in phosphate buffers. An activator of discoloring tubers became inactive by dialysis, heat, or time exposure, and was not recovered in the sap ash. Apparently other factors contribute to the abnormal tyrosinase activity.—W. E. Tottingham.

TOXICITY

17733. KERSTING, FRANZ. Zur Frage der Kationenwirkung auf die lebende Pflanzenzelle. Jahrb. wiss. Bot. 87(5): 706-749, 1939.—Seedlings rooted in sawdust, or aerial roots of *Tradescantia* etc. used for the expts.; either type

of root behaved similarly to the poisonous solns. (MgSO, K.SO, or distilled water). The amount of Ca or other elements in roots had no effect on the degree of toxicity of these external solns. The expts, showed that the disease symptoms produced by these solns, were not due to a lack of necessary nutrients but must be due to their effect on the surface of the cell protoplast. With rise of temp, the toxicity increased and at all temps, roots are more sensitive to Mg than to K solns. Light is without effect on the toxicity. Cytological observations are described on the root systems poisoned by these solns.; the cells lose some of their plasma and the structure of both nucleus and cytoplasm is disorganized; the mitotic irregularities noted are regarded as artefacts, largely due to the action of fixatives on the disorganized cell; the author concludes

that these irregular division figures could not be explained as due to Ca deficiency.—J. H. Priestley.

17734. TRELEASE, SAM F., and HELEN M. TRELEASE. Physiological differentiation in Astragalus with reference to selenium. Amer. Jour. Bot. 26(7): 530-535. 3 fig. 1939.—A. racemosus, growing in solution and sand cultures, was greatly stimulated by Se (as selenite) in concs. of from 0.33 to 9 ppm.; these tests confirm earlier expts. in suggesting that Se may be an essential microtrophic element for this species of Astragalus. A. crassicarpus was poisoned by Se, being severely injured by a cone as low as 0.33 ppm. (as selenite). A. racemosus, having a higher collerance than A. crassicarpus to Se, could accumulate correspondingly higher concs. of this element from solns. containing selenite. The greenhouse tests of growth in artificial media confirm field observations in showing a physiological differentiation of Astragalus spp. into 2 groups: those which seem to require Se for their development and so serve as indicators of seleniferous soil areas, and those which do not utilize selenium.—S. F. Trelease.

APPARATUS, METHODS

17735. CHRISTENSEN, B. E., E. HANSEN, V. H. CHELDELIN, and J. B. STARK. The determination of ethylene evolved by apples and pears. Science 89(2310): 319-321. 3 fig. 1939.—A method applicable to small lots of fruit is described and compared with existing procedures. -Courtesy Exp. Sta. Rec.

17736. HAVER, FORREST E. Jr., and JACK COMPTON. A method for the quantitative determination of glucose and fructose in the presence of pentoses. Contr. Boyce Thompson Inst. 10(4): 441-451. 2 fig. 1939.—The method depends primarily upon the quantitative removal of glucose and fructose from hexose-pentose mixtures by selective yeast fermentation. The Hanes modification of the Hagedorn-Jensen ferricyanide procedure was employed for dedorn-Jensen ferricyanide procedure was employed for determining the total reducing sugars present before, A, and after, C, yeast fermentation. The titration, C, may be converted directly to mg. per cc. of pentoses present and the difference in the titrations, A-C, to mg. per cc. of hexoses (glucose+fructose) present. Making use of the Willstätter-Schudel iodometric test for the aldose sugars (glucose+pentoses) titration, B, was detd. Employing the proper conversion factors the titration differences, B-C, give the glucose present in mg. per cc. and A-B the fructose present in mg. per cc. High accuracy is claimed for the method.—J. Compton.

17737. SCHRICKER, J. A., and P. R. DAWSON. Improved molybdenum blue reagents for determination of

proved molybdenum blue reagents for determination of phosphorus and arsenic. Jowr. Assoc. Offic. Agric. Chem. 22(1): 167-179. 1 fig. 1939.—Determinations of minute quantities of phosphates in soil extracts, plant material, etc., were found to be affected both by the buffer action of appreciable concentrations of salts and by the composition of the ceruleomolybdate reagent. The ranges of conc. of H₂SO₄, molybdic oxide, and reduction over which color intensity remains practically constant were detd. The conditions for minimum interference of yellow tints, silica, and salt effects were shown to require the minimum reduction and molybdic oxide concs. and the maximum H₂SO₄ conc. compatible with uniform and complete color development. Modified molybdenum blue reagents meeting these requirements used in the proportion of 1 part per 100 parts of test soln, have a H₂SO₄ cone. of 36 N, reduction cone. of 0.04 N, and molybdic oxide conc. of 0.18 M and 0.32 M

nd As, respectively. In composition they conform M Mow Os and Mox Os for P and As, respectively, ation of the reagents themselves requires little time, but temp, and time are important factors in actual velopment up to the point where a final stable end reached. Great precision may be obtained by ag the colors in a photoelectric colorimeter, as Iy or less equivalent of P being readable." Quinallin place of β -dinitrophenol as an indicator for ary adjustment of the pH of the test solution is ended. Sulfurous acid is recommended instead of little to prevent As and nitrite interference in highly and salt-containing solns, such as soil extracts, mative method for P, specifying a sulfomolybdic gent corresponding in conc. to the molybdenum gent and methol as a reducing agent, is also de-Courtesy Exp. Sta. Rec.

CHEMICAL CONSTITUENTS

GRIFFIOEN, K. Changes in the composition eedles of Pinus austriaca Link during the ageing-Rec. Trav. Bot. Néerland. 36: 347-355. 1 fig. 1939. transition zone between the small growing zone much larger full-grown part of the pine needle themical alterations take place. Cell-wall sub-(pectin, lignin, cellulose and hemicelluloses) and nts soluble in ether, alcohol-benzene, water and id were detd. in 4 successive parts of young needles in length) of Pinus austriaca. The large amt. (belonging to the catechol group) present in the seriously disturbs the determination of lignin. ving parts of the needle seem to be very rich in cohol- and water-soluble components and in tannin, in the 4 cell-wall substances. The full-grown parts, ve a rather constant composition during the ageing ole needle, show an important increase of cellulose, and lignin, a considerable decrease of tannin and y change of the pectin, compared with the growing . Grifficen.

GRONER, MIRIAM G. Sugar excretion in Imbultani. Amer. Jour. Bot. 26(7): 464-467. 1 fig. oplets of almost pure sucrose soln. are excreted hair-like protuberances on the petioles of the f. sultani that were studied. Wherever these are not removed by natural forces or artificial they increase in size, and lose water through n until granules of crystalline sugar are formed. tity of sugar excreted varies with the amt. of sugar excreted and lose noticeably with

tity of sugar excreted varies with the amt. of vailable to the plant, and less noticeably with The greatest quantities of sugar are produced plants have become well pot-bound. A var. with white leaves produces only a very small quantity s compared with the commoner types with solid es. The chemical nature of the sugar was detd. rement of specific rotation before and after and determination of mol. wt. by the freezing-tod.—M. G. Groner.

KNIAGINICHEV, M. I., and T. M. GORELKINA. peculiarities of starch in cereal and luguminous s. Compt. Rend. (Doklady) Acad. Sci. URSS 17-121. 1938.—From a study of several genera s of legumes and cereals, it is concluded that and genera form starch granules differing in rties (jellying temp., hydrolysis by diastase and and P content). When hydrolysed by diastase ormation in jellied starch is almost the same in studied (wheat, rye, barley, beans, cowpeas,

and peas). The structural peculiarities of the starches are not only inherited; they also vary with the climate and the local agricultural practice. While the initial products of starch synthesis in the plants investigated are closely related, in subsequent periods of development, as starch linkages appear, there arise the differences found in genera, spp., and vars.—Oran Raber.

MISCELLANEOUS

17741. BROWN, E. MARION. Equipment for the growing of plants at controlled temperatures. Plant Physiol. 14(3): 517-526. 2 fig. 1939.—Three thermo-regulated growth chambers designed for the growing of plants at controlled temps. were located within and along the south side of a greenhouse, the long axis of which extended east and west. All 3 growth chambers operate simultaneously with air and soil temp. independently controlled. Standard airconditioning refrigeration equipment is used to cool the air and soil, and standard electrical heaters to supply heat. Each growth chamber is large enough to contain 12 metal pots 8 inches in diam. at the top and 18 in. deep.—E. M. Brown.

17742. CARROLL, GEORGE H. Sintered pyrex glass aerators. Plant Physiol. 14(3): 603-605. 1939.—A rapid and economical method for the production of sintered pyrex glass aerators for water-culture expts., aquaria, etc.—G. H. Carroll.

17743. ROBERTSON, D. W., A. M. LUTE, and ROBERT GARDNER. Effect of relative humidity on viability, moisture content, and respiration of wheat, oats, and barley seed in storage. Jour. Agric. Res. 59(4): 281-291. 1939.—
Heavy treatments with Ceresan before storage decreased the length of life of seeds stored at high humidities. The length of life of both treated and untreated seeds in storage increased as the humidity decreased over the range studied. Serious injury was suffered by all grains at 100% saturation within a month. The injury decreased with decreased humidity. Only a slight loss in viability was found in some samples at the end of 1,032 days' storage in an atmosphere of 57.6% saturation. Respiration, as measured by CO₂ production, increased regularly with relative humidity. Moisture percentage changed more consistently with humidity than either viability or respiration. The data showing the rates of change of moisture and viability with humidity offer a means of predicting the maximum time which would be safe for storage under any given relative humidity, assuming temp. conditions comparable to those of the expt. Heavy fungus growth developed on all grain at the higher humidity when the grain was not treated with a fungicide. The data do not show what influence these organisms and the bacteria that probably accompanied them had on the decrease in viability of the seed.—Auth. summ.

17744. VOSS, W., L. BAÜR, und J. PFIRSCHKE. Zur Kenntnis des Xylans. 2. Über Studien zum Verholzungsproblem. Justus Liebig's Ann. Chem. 534(2/3): 135-161. 1938.—Discusses determination of the degree of rotation of xylan; the influence of the conc. of alkali on the degree of rotation; detection of small amts. of sugar in a polysaccharide; and the composition of xylan.—M. Neuhof. 17745. WENUSCH, A. Grundlegende Versuche zur

17745. WENUSCH, A. Grundlegende Versuche zur Kenntnis des Einflusses von Press-säften von Tabakstengeln auf Rohrzucker. Zeitschr. Untersuch. Lebensmittel 77(3): 281-283. 1939.—20 cc. of juice pressed out of tobacco stems added to 80 cc. of a 10% sucrose soln. produces a gel.—M. Kleiber.

PHYTOPATHOLOGY

FREEMAN WEISS, Editor

in this issue Entries 16173, 16182, 16229, 16237, 17397, 17494, 17495, 17502, 17555, 17569, 17574, 17578, 586, 17600, 17622, 17642, 17671, 17677, 17704, 17712, 17743, 17862, 17869, 17877, 17957, 17958)

DISEASES CAUSED BY FUNGI

BAINES, R. C. Phytophthora trunk canker or f apple trees. Jour. Agric. Res. 59(3): 159-184. 1939.—A serious trunk canker or collar rot of in Indiana, caused by P. cactorum, is described.

The disease is believed to have occurred in Indiana as early as 1900. Grimes Golden and Rome Beauty trees 13-19 yrs. old are frequently infected. Trunk cankers were produced by artificial inoculations on the 2 vars. above and on Gano, Northwestern Greening, Smokehouse,

Stark, and Thompkins King. No infection resulted from inoculations on the trunks of 33 other apple vars., 10-30 yrs. of age. Physiologic races of *P. cactorum* differing in pathogenicity on vars. of apple trees are demonstrated. The trunks of Grimes trees less than 5 yrs. of age, were resistant to infection, while Grimes trees 8-30 yrs. of age were infected readily when artificially inoculated. The component varietal portions of double- and high-grafted Grimes Golden trees retained their specific resistance or susceptibility to *P. cactorum* unaltered by stock or scion influence. Cankers were effectively eradicated by decortication of the infected bark, and were killed by 10% Na arsenite in 50% alcohol applied on the bark.—*R. C. Baines*. 17747. GEMMELL, A. R. Synergism in fruit-rotting fungi. *Chron. Bot.* 5(1): 41, 42. 1939.—The author presents

17747. GEMMELL, A. R. Synergism in fruit-rotting fungi. Chron. Bot. 5(1): 41, 42. 1939.—The author presents an explanation based on his own expts. of the mutually advantageous relationship of Penicillium digitatum and Cospora citriaurantii causing a rot of citrus noted by Savastano and Fawcett.—Courtesy Exp. Sta. Rec.

Savastano and Fawcett.—Courtesy Exp. Sta. Rec.

17748. HANSEN, H. N., and H. EARL THOMAS.
Camellia blossom blight. Phytopath. 29(9): 824. 1939.—In
San Francisco Bay region; due to an undescribed Sclerotinia.

17749. HUBER, GLENN A., and KARL E. BAUR. The

17749. HUBER, GLENN A., and KARL E. BAUR. The occurrence of Sclerotinia fructicola and S. laxa on stone fruits in western Washington. *Phytopath*. 29(9): 825. 1939.—Abstract.

17750. JONES, FRED REUEL. Four fungus parasites of sweet clover infecting seed. Phytopath. 29(10): 912-913. 1939.—Ascochyta caulicola, Cercospora zebrina, Leptosphaeria pratensis and Mycosphaerella lethalis were cultured from viable sweet clover seed.—F. R. Jones.

17751. KIRCH, E. R. Hydrolytic cleavage and oxidation of soybean meal by Penicillium luteum purpurogenum and Aspergillus niger. Food Res. 4(4): 363-370. 2 fig. 1939.—40-g. portions of soybean meal mixed with 800 cc. of distilled water were inoculated with P. luteum purpurogenum and A. niger respectively. The Penicillium hydrolyzed the protein portion of the meal to some extent. Free amino acids could not be isolated. The carbohydrate portion of the meal was not acted upon by this organism. A. niger attacked both portions of the meal. The protein portion was hydrolyzed to a greater extent than the carbohydrate portion when using 6-day-old cultures. Using cultures of 20-day growth more acid was produced from the carbohydrate. The presence of vitamin B₁ in the substrate is beneficial but not as essential.—E. R. Kirch.

17752. Leclerg, E. L. Studies on dry-rot canker of sugar beets. *Phytopath*. 29(9): 793-800. 2 fig. 1939.—The morphology, physiology and pathogenicity of various isolates of Rhizoctonia from dry-rot canker of sugar beets were studied and comparisons were made between these strains and those that cause crown rot of sugar beets and those that attack potatoes. Ave. diam of hyphae of 6 dry-rot canker isolates ranged from 7.4 to 8 μ . Radial growth of the crown-rot group of isolates on artificial media is greater than that of the dry-rot canker and potato groups. Growth was most rapid for all 3 groups on potato dextrose agar, less rapid on low-N agar, and slowest on high-N agar. The opt. temp. for radial growth of the dry-rot canker and crown-rot isolates is 30° C; for the potato isolates 25° C. The dry-rot canker pathogen is most active in causing decay of sugarbeet roots at a soil temp. of 30-35° C and is favored by low soil moisture. The dry-rot canker and crown-rot isolates, as groups, are about equally virulent in causing reduction in stand of corn seedlings and are more virulent than those of the potato group. Greater reduction in stands of peas, sugar beets, and cabbage is caused by crown-rot of peas, sugar beets, and cabbage is caused by crown-rot isolates, as a group, than by the dry-rot canker and potato groups. The crown-rot isolates as a group are more virulent on beans than the dry-rot canker group. The dry-rot canker isolates from sugar beets differ in many respects from crown-rot isolates from the same host. These differences, particularly as regards symptoms on sugar beets, are in most cases of such magnitude as to warrant designation of a different species. However, until the perfect stage of the dry-rot canker pathogen is found, it seems advisable to maintain the species designation as suggested by Richards. - $E.\ L.\ LeClerg.$

17753. LEFEBYRE, C. L., and J. L. WEIMER. Choanephora cucurbitarum attacking cowpeas. Phytopath. 29 (10): 898-901. 2 fig. 1939.—C. cucurbitarum was found causing a decay of the pods of Groit cowpeas at Experiment, Georgia in 1937. About 5% of the pods in one field were affected. Again in 1938 it was found rotting cowpea pods but because of the extremely dry summer, it caused little damage on the 9 vars. that were affected. The fungus can attack the green as well as the more mature tissues of the pods. Under oil-immersion objective, the walls of the sporangiospores show fine longitudinal striations. The fungus is commonly saprophytic on leaves of various grasses in Georgia and Florida, when such leaves are incubated in moist chambers.—Authors.

in moist chambers.—Authors.

17754. MILLER, PAUL R. Pathogenicity, symptoms, and the causative fungi of three apple rusts compared. Phytopath. 29(9): 801-811. 3 fig. 1939.—The assembled evidence indicates that the cultivated apple in eastern U. S. has been affected for some time by 3 distinct rusts, designated as "apple rust" (Gymnosporangium juniperivirginianae), "hawthorn rust" (G. globosum), and "quince rust" (G. clavipes), of which the latter 2, for the most part, were not recognized as distinct apple diseases by early workers; and that this condition probably accounts for much of the diversity of opinion as expressed in the literature relative to apple varietal susceptibility. Comparative symptomatology of the 3 diseases and the morphological characters of their causative fungi are presented in tabular summaries as aids to diagnosis.—P. R. Miller.

17755. MILLER, PAUL R. The relation of aeciospore

17755. MILLER, PAUL R. The relation of aeciospore germinability and dissemination to time of infection and control of Gymnosporangium juniperi-virginianae on red cedar. Phytopath. 29(9): 812-817. 1 pl. 1939.—Differential infection of red cedar trees exposed and covered in monthly relays over a 10-month period indicated maximum aeciospore dissemination in July, August, and Sept. In aeciospore germination tests over a 4-year period germinability was lowest in summer when the spores were first released and highest in late winter. Fall inoculation of 25 red cedar trees resulted in several large galls on the stems of 1 tree; an equal number of spring inoculations, with overwintered spores from the same source, in numerous small galls attached to the leaves on all trees. The place of infection may be determined by relative susceptibility of leaf and stem tissue in fall and spring. Limited exptl. data suggest the possible effectiveness of a dormant spray for prevention of infection on ornamental junipers.—P. R. Müller.

attached to the leaves on all trees. The place of infection may be determined by relative susceptibility of leaf and stem tissue in fall and spring. Limited exptl. data suggest the possible effectiveness of a dormant spray for prevention of infection on ornamental junipers.—P. R. Miller.

17756. PRETI, GIACOMO. Moria di piante de "Cereus peruvianus monstruosus" per "Fusariosi" in Provincia di Imperia. [The killing of C. peruvianus monstruosus plants by fusariosis in the province of Imperia.] Riv. Patol. Veg. 29(3/4): 169-183. 6 fig. 1939.—C. p. monstruosus plants were found in a greenhouse in August rapidly dying. The affected parts turned brown, softened and became later a black spongy mass. Fusarium oxysporum was found fruiting on the diseased plants. It was isolated and inoculated into healthy plants reproducing the disease. High temp. and humidity favored infection.—F. M. Blodgett.

17757. RAMIREZ, INOCENCIO. Schizophyllum commune

17757. RAMIREZ, INOCENCIO. Schizophyllum commune Fr.—a forest-products-rotting fungus. Philippine Jown. Forest. 2(2): 121-143. 2 pl. (1 col.) 1939.—S. commune is the commonest wood-rotting fungus of the Philippines. Tests showed that vegetative bodies of the fungus could develop inside small pieces of the wood of bagilumbang (Aleurites trisperma) when the moisture content was above 18%, and were not killed by subjecting the wood for 16 days to temp. of 46° C or for 16 days to 46° plus 2 days at 100°, if it was kept moist. Temps. of 100° in an oven killed the fungus. Small pieces of wood attacked by the fungus for 72 days lost 7% of their dry wt. Presence of fruiting bodies is the only positive means of detecting infection by S. commune. The most practical control measure in lumber yards is eradication of the sources of infection.—W. N. Sparhawk.

17758. SIMMONDS, P. M. A review of the investigations conducted in western Canada on root rots of cereals. Sci. Agric. [Ottawa] 19(9): 565-582. 1939.—The literature dealing with investigations on the rootrots of cereals in Western Canada up to 1936 is reviewed. Very little work on these diseases was done previous to 1920. Subsequently many comprehensive projects were started. The take-all (Ophiobolus graminis) rootrot of wheat was discovered

Canada in 1923. Laboratory and field studies soon led suitable control methods by means of crop rotation. browning rootrot (*Pythium* spp.) of wheat was investida a few years later. It was found that the damage ch this disease may cause can be greatly reduced by per use of phosphate fertilizers. Common rootrot of als caused mainly by *Helminthosporium sativum* and arium spp. constitutes a major problem. Investigations this disease complex were included in the first projects lined when studies were started about 1921. So far no ticable control measures for general use can be recomided. In developing control measures for rootrots, to breeding and selection have been of little direct help date; Besides the 3 well known types reviewed, the sence of other forms of cereal rootrot are suspected is pointed out that changes in agricultural practices r necessitate modifications in control methods which and upon crop rotations and the use of fertilizers.—

M. Simmonds.

7759. SNYDER, W. C., and H. N. HANSEN. Culture hods in relation to Fusarium identification. Phytopath.

i): 827. 1939.—Abstract.

760. THIRUMALACHAR, M. J. Rust on Jasminum diflorum. Phytopath. 29(9): 783-792. 3 fig. 1939—nyces hobsoni, an autoecious rust on J. grandiflorum, es hypertrophy of leaves, stems, and flowers. Three sforms (aecia, pycnia, and telia) occur side by side the hypertrophied portions of the host. Uredia are nt. The development of aecia proceeds almost throughthe season. Telia develop within the old aecial cups their base. Pycnia rarely have been reported hitherto. erous pycnia were examined. In many cases, aecia telia were seen to develop within the pycnial cup. On inating, aeciospores produce a 2-celled germ tube develops 1 or 2 whip-like structures. These structures not sterigmata, but are of the nature of appresoria. spores germinate without rest, and form 3-4 binucleate iospores. Formation of secondary and tertiary sporidia observed. Infection expts. with aeciospores are dedd. The whip-like structure developed on the germ enters the stoma. As a result of infection secondary are formed. The mycelium associated with pycnia, he basal cells of pycnia are binucleate. The binucleate tion is found in the aecial initials and the aecial lium, and in the basidiospores.—M. J. Thirumalachar. 61. TOMPKINS, C. M., and J. T. MIDDLETON. For of Ranunculus asiaticus caused by Pythium yanum. Phytopath. 29(9): 828. 1939.—Abstract.

DISEASES CAUSED BY BACTERIA

53. BONDE, REINER. Comparative studies of the is associated with potato blackleg and seed-piece Phytopath. 29(10): 831-851. 1939.—The morphophysiological and pathological characteristics of 62 is pathogens found associated with potato blackleg, iece decay and other soft-rot diseases, were studied is capable of causing blackleg were secured from a ange of sources which lends support to the view that sease often may originate from contamination which after the seed tubers have been cut, and not from it infection. The blackleg cultures secured from the at sources were identical in all of the physiological existics excepting in the production of gas on the sucrose and lactose, and in the production of They varied in their pathogenicity on potato stems ed pieces. The causal agents of soft rot found in it host plants are strains of the same organism, a caratovora. Other bacterial pathogens, not previlescribed, were found to be causal agents of seedecay in Maine and S. Carolina. These were studied eight characteristics are given.—R. Bonde.

4. PIERSTORFF, A. L. Fire blight. Proc. Ohio

HERSTORFF, A. L. Fire blight. Proc. Ohio Hort. Soc. 72: 61-63. 1939.—Abundant rainfall and blication of mitrogenous fertilizer result in vigorous rowth on apple and pear trees. Meteoric water also fire blight bacteria from hold-over cankers to blossoms where they multiply rapidly. Several

bright days during bloom promotes the activity of pollinating insects which spread the inoculum to many blossoms thus creating conditions which result in blight epiphytotics. Applications of Bordeaux sprays (during bloom) and the use of less N as fertilizer will reduce the number of infections. The removal of blighted pear limbs as rapidly as observed is suggested. Blighted apple limbs should not be disturbed during the summer but removed during the fall. Treatment of cankers with ZnCl₂ soln. during the dormant season is recommended.—A. L. Pierstorff.

17765. RIKER, A. J., and I. L. BALDWIN. The efficiency of the poured plate technique as applied to studying bacterial plant pathogens. Phytopath. 29(10): 852-863. I fig. 1939.—The poured-plate technique, while generally useful, seems inadequate for various critical bacteriological studies because (1) many of the colonies develop from bacterial clumps, (2) small colonies often coalesce to form a single colony, and (3) practical experience has shown that pure cultures are not always thus secured. Various modifications of the poured-plate method are much better than the ordinary procedure. Estimates are given of the probability that colonies may coalesce as they grow, which may have application to bacterial plate counts and to the local lesion method for studying plant viruses. Single-cell isolations give greater assurance of pure cultures than do even well-controlled dilution plates. However, both methods have their advantages, and may well be used to supplement each other.—Authors.

DISEASES CAUSED BY PHANEROGAMS

17766. RAO, NARAYANA L. Perennation in Cuscuta reflexa Roxb. New Phytol. 37(5): 474-477. 1 fig. 1938.— A new method of perennation of Cuscuta is deser, whereby, after flowering, the parasite dies and the host repairs its wounds. However, the haustorial tissues of the parasite often persist in the body of the host during the dry months of the year, and give rise to a number of young shoots early in the following growing season. This method of perennation appears to be an adaptation to the ecological conditions under which the parasite is obliged to grow.— J. R. King.

17767. TAMBLYN, N. Macrozamia roots in jarrah trees. Australian Forestry 4(1): 45. 1939.—Upward-growing roots in hollow stems ("pipes") in mature living jarrah (Eucalyptus marginata) trees were indentified as roots of Macrozamia reidlei (zamia palm). Some of them extended up the tree for 20 ft. or more.—W. N. Sparhawk.

DISEASES CAUSED BY ANIMAL PARASITES

17768. FICHT, G. A. Root-knot nematode of tomatoes in relation to the Indiana canning crop. Indiana Agric. Exp. Sta. Bull. 434. 1-15. 8 fig. 1939.—As an important pest of canning tomatoes in Indiana, nematodes occur primarily in fields set to plants originating in the South. Infestation produces important effects on the yield of canning fruits, the amount set being reduced and the size being smaller, with the consequent lowering of quality of some types of pack. The decreased income to growers from this pest has amounted to as much as \$32 per acre. No evidence has been obtained for the winter survival of Heterodera marioni in the open in northern Indiana, though it has been known to live over in Ohio and New York. Rotations should include corn, wheat, oats, sweet clover, grasses, or other resistant hosts, and tomato plants should be examined for infestation before setting out.—Courtesy Exp. Sta. Rec.

infestation before setting out.—Courtesy Exp. Sta. Rec. 17769. LIMBER, DONALD P. Notes on the hot-water treatment of Anguina tritici galls on wheat and a comparison of an Indian and a Chinese collection by use of weight criteria. Proc. Helminthol. Soc. Washington 5(1): 20-23. 1938.—Preliminary soaking for 2 hrs. at 70-80°F, followed by 30 min. in water at 120°F killed all the nematodes present in the galls. The Indian galls averaged 2,110 worms per mg. of gross wt. as compared with 2,829 for the Chinese galls.—G. F. Otto.

17770. LINFORD, M. B. Attractiveness of roots and excised shoot tissues to certain nematodes. Proc. Helminthol. Soc. Washington 6(1): 11-18. 2 fig. 1939.—Direct microscopic observations through glass show that larvae of Heterodera marioni congregate around roots and move down to the elongating zone just behind the root cap.

Larvae and 99 of Pratylenchus pratensis and Rotylenchus multicinctus congregate more slowly around roots and remain in the mature root zone where they penetrate and feed. Aphelenchus avenae, reared in agar cultures of fungi, shows little grouping around sound roots. Pieces of fresh tissue cut from green leaves and stems of diverse plants are strongly attractive to *H. marioni* larvae and remain attractive as they decompose. More limited tests indicate that R. multicinctus similarly responds to green tissues but that A. avenae does not. H. marioni larvae in agar congregate around yeast colonies over which glass coverslips have been placed, indicating either an attraction or a trapping through the mechanism of retarded locomotion through anaerobiosis.—Auth. summ.

17771. McBETH, C. W. White clover as a host of the sugar-beet nematode. Proc. Helminthol. Soc. Washington 5(1): 27-28. 1 fig. 1938.—Heterodera schachtii is reported from root-knot of white clover. Many of the growing rootlets were destroyed but the plants were not killed.—G. F.

Otto.

17772. STEINER, G., and J. R. CHRISTIE. Nematodes observed on diseased rhizomes of ginger from Peru. Proc. Helminthol. Soc. Washington 6(1): 26-29, 1 fig. 1939,-Neocephalobus peruënsis is described and figured from the diseased rhizomes of ginger. The sucking activity of the esophagus is described and the feeding habits of the worms considered. Aphelenchoides hunti is reported to be oviparous and the preponderance of \mathfrak{P} in this species is noted.— $G.\ F.$

17773. THOMAS, HAROLD E. The stem nematode disease of oats and peas. Phytopath. 29(9): 827. 1939.— Abstract.

17774. TYLER, JOCELYN. Egg output of the root-knot nematode. Proc. Helminthol. Soc. Washington 5(2): 49-54. 1938.—Females of the root-knot nematode, Heterodera marioni, continued egg laying throughout the period of dematum, continued egg laying throughout the period of development of the 2d generation and showed no signs of exhaustion before larvae of 3d generation began to hatch. The usual estimate of 300-500 eggs per 2 is probably too low an average; all egg masses contained over 500 eggs with a maximum of 2,882. The immediate escape of larvae upon hatching would alone account for a reduced count; even 2 resistant plants, wheat and sudan grass, contained masses of over 500 eggs. Daily egg production varied from 25 to 121.-G. F. Otto.

VIRUS DISEAES

17775. ABBOTT, E. V. Chlorotic streak of sugarcane. Sugar Bull. [New Orleans] 16(20): 4-5. Illus. 1938.—The symptoms and effects of the chlorotic streak disease of sugarcane, believed to be of virus origin, are described, and the possible importance of the disease in Louisiana, where it was recently discovered, is discussed.—E. V. Abbott.
17776. CALINISAN, MELANIO R. A comprehensive study

on symptoms of abaca mosaic. Philippine Jour. Agric. 10(2):

121-130, 9 pl. 1939.

17777. FAWCETT, H. S., and L. J. KLOTZ. Infectious variegation of citrus. *Phytopath*. 29(10): 911-912. 1 fig. 1939.—An effect on lemon leaves resembling certain forms of variegation on ornamentals was transmitted to sour orange stocks by budding. A partial resemblance to infectious chlorosis described by Petri is noted. A flecking of young leaves identical with psorosis suggests a relation-

ship to that disease.—Authors.
17778. FREITAG, JULIUS H., and HENRY H. P.
SEVERIN. Additional celery viroses. Phytopath. 29(9):

824. 1939.—Abstract.

17779. HAASIS, FRANK A. White streak, a virus disease of narcissus. Phytopath. 29(10): 890-895. 1 fig. 1939.— White streak is an infectious disease of narcissi caused by a virus. The virus is mechanically transmissible. The white streak virus is considered to be different from the mosaic virus of narcissi, the difference being based on symptom expression. Observational evidence suggests that the 2 viruses may be closely related. The only known method of control is eradication of diseased plants and isolation of healthy plants.—F. A. Haasis.

17780. HUBER, GLENN A. Transmission of black-

raspherry mosaic by the cane-feeding aphid, Amphorophora rubicumberlandi. *Phytopath.* 29(9): 825. 1939.—Abstract.

17781. KAUSCHE, G. A., Über Färhungsmöglichkeiten von pflanzlichem Virus. Biol. Zentralbl. 59(9/10): 536-541, 3 fig. 1939.—In the plant cell, virus proteins occur in the dissolved state but by suitable methods can be precipitated in the form of specific aggregates of supra-molecular dimensions, which may then be stained. The tobacco mosaic virus forms linear aggregates with a tendency to unite in tufts; the aucuba mosaic virus forms fine slender threads without the tendency to adhere in tufts.—A. H. Hersh.
17782. KEITT, G. W., and C. N. CLAYTON. A destruc-

tive bud-transmissible disease of sour cherry in Wisconsin. Phytopath. 29(9): 821-822. 1939.—An unfruitful condition— "physiological yellow leaf"—of sour cherry (Prunus cerasus) is widespread in Wisconsin. Reciprocal budding expts. between diseased and healthy Montmorency trees resulted in transmission of the disease. Microscopic examinations and platings showed no evidence of a causal fungus or bacterium.

G. W. Keitt

17783. LAVIN. G. I., HUBERT S. LORING, and W. M. STANLEY. Ultraviolet absorption spectra of latent mosaic and ring spot viruses and of their nucleic acid and protein components. Jour. Biol. Chem. 130(1): 259-268, 1939.—The absorption maximum of latent mosaic virus, like that of tobacco mosaic virus, is at about 2650 Å; that of ring spot virus is at about 2600 Å. Ring spot virus, however, absorbs much more strongly than any of the other viruses, due probably to its high nucleic acid content. The nucleic acids from the 3 viruses show absorption maxima at about 2600 Å, and are comparable in this respect to those from yeast and from pneumococci. The protein components are like other simple proteins in that they have absorption maxima at about 2800 Å. When the respective nucleic acids and proteins were mixed, the absorption curves approached those for the original viruses, but in each case there were differences. The detailed band structures of the various preparations as obtained with a continuous light source are presented. The different viruses and their respective protein components have characteristic structures. The 3 nucleic acid components show only a broad band of absorption at about 2600 Å. The spectrum of tobacco mosaic virus inactivated by formaldehyde or H.O. is like that of active virus: that of virus inactivated by nitrous acid has its most intense band in a different region of the spectrum.—Auth. summ.

17784. LORING, HUBERT S. Properties and hydrolytic

products of nucleic acid from tobacco mosaic virus. Jour. Biol. Chem. 130(1): 251-258. 1939.—About 90% of the P in purified tobacco mosaic virus was isolated as nucleic acid, indicating that probably all of the virus P is combined in this way. The general properties and chemical analyses of the virus nucleic acid are comparable to those of other ribonucleic acids. The purines, guanine and adenine, the pyrimidine, cytosine, and the brucine salt of a compound having the N and P content of the brucine salt of yeast uridylic acid were isolated from its hydrolytic products. The optical activity and solubility of this brucine salt in comparison with the brucine salt of yeast uridylic acid, however, indicated that the two were isomeric rather than identical. The expts. provide evidence, therefore, for the presence of a new pyrimidine nucleotide in a pentose nucleic

acid.-H. S. Lorino

17785. McWHORTER, FRANK P. The white streak or white stripe disease of narcissus. Phytopath. 29(9): 826.

1939.—Abstract.

17786. NEUGEBAUER, TH. Über eine physikalische Theorie der Selbstreproduction der Viren. Physik. Zeitschr. 40(11): 406-408. 1939.—The reproducing virus molecule is pictured as in a surface-active, extended state (as in the opened cyclol cage of Wrinch). When a host protein molecule approaches sufficiently close a strong van der Waals attraction sets in which may cause shifts in atomic positions so that one molecule (that of the host) may be changed into the other. A method is described for the approximation of the attraction energies of atom pairs through the use of data for polarizability and magnetic susceptibility. Calculations are presented for H, C, N, and O. The energies of chemical union of C-O, C=O, C-N, C=N, O-H and N-H are shown to be of the same order of magnitude, so that the free energies arising from the close approach of several atom pairs are sufficient to rupture and thus change chemical linkages.-G. Marsh.

17787. PRICE, W. C. Cross protection tests with two strains of cucumber-mosaic virus. Phytopath. 29(10): 903-905. I fig. 1939.—A close relationship between Doolittle's and Porter's cucumber-mosaic viruses is indicated by their symptomatology, host range, and properties. The relationship has, however, been questioned by Chester's failure to obtain a serological reaction between the 2 viruses. In the present work, leaves of Zinnia elegans mottled by Doolittle's virus were found to be completely protected from No. 6 strain of Porter's virus. In spite of their serological differences, these viruses should be classified in the same virus group.—W. C. Price.

group.—W. C. Price.
17788. PRUTHI, HEM SINGH, and C. K. SAMUEL. Entomological investigations on the leaf-curl disease of tobacco in northern India. III. The transmission of leafcurl by white-fly, Bemisia gossypiperda, to tobacco, sunnhemp and a new alternate host of the leaf-curl virus. Indian Jour. Agric. Sci. 9(2): 223-275. 4 pl. 1939.—The white fly, Bemisia gossypiperda, is an important vector of the tobacco leaf-curl viruses of the 5 recognized types. Sunn hemp is an important alternate host of the tobacco leaf-curl viruses A and X, the 2 viruses causing different symptoms in sunn hemp, giving rise to 2 types of disease, designated as S.V.1. and S.V.2. The white fly readily transmits both viruses from sumn hemp to tobacco. As the sumn hemp and tobacco seasons overlap slightly in North Bihar, it is likely that sunn hemp is an important source of infection for tobacco. Though the white fly can transmit leaf curl from tobacco to sunn hemp, it does not seem to be an efficient vector. Only during July a few transmissions were obtained, using diseased tobacco of last year as the source of virus. In nature, sunn hemp appears to become infected in July as the incidence of leaf curl in this crop is highest during August. In North Bihar leaf curl does not appear in tobacco before the middle of Sept., therefore tobacco does not appear to be the source of infection for sunn hemp. The weed Ageratum conyzoides is another important alternate host of tobacco leaf curl, especially of D type. The white fly readily transmits the virus from this host to tobacco, and from tobacco to the weed. A. conyzoides is perennial in North Bihar and is evidently an important source of infection for the D type leaf curl of tobacco. The white fly also transmits the virus from sunn hemp to A. conyzoides, but does not transmit it back to sunn hemp readily. The results of 2 yrs.' expts. show that the white fly does not readily transmit the virus from diseased to healthy tobacco. These 2 accessory hosts harbor leaf curl viruses A, D and X, but the other hosts, if any, for B and C types are still unknown. Both tobacco and sumn hemp are most susceptible to leaf-curl infection in their juvenile stages. The incubation period of the virus in the plant is similarly influenced by the stage of development. The white fly can transmit the virus after 5-6 hrs. of feeding. The min. no. of flies found capable of transmitting the virus from sunn hemp to tobacco was 5, from tobacco to sunn hemp and from sunn hemp to sunn hemp this no. was 2, and from Ageratum to tobacco it was 1. The white fly breeds freely on several other hosts, some of which (oucurbits, hollyhock, Zinnia, Scoparia, and Sida) show leaf curl symptoms. The best prospect of successful control appears to be through control of the vector.— From authors' abstract.

17789. QUANJER, H. M. Problemen betreffende virusziekten van enkele Nederlandsche cultuurgewassen. [Virus disease problems of some Dutch crops.] Landbouwk. Tijdschr. 51: 171-177. 1939.—A short survey of important virus diseases of beets, spinach, cucumber and beans.—I. Rietsema. 17790. SEVERIN, HENRY H. P., and SIDNEY J. OLIVER. Delphinium aster yellows. Phytopath. 29(9): 826. 1939.—Abstract.

17791. SOUKHOV, K. S., and A. M. VOVK. Mosaic disease of oats. Compt. Rend. (Doklady) Acad. Sci. URSS 19 (3): 207-210. 2 fig. 1938.—A new mosaic disease of oats is described from Siberia. Although attempts at infection with sap failed, the virus nature of the disease is indicated by: (1) a definite time (18 days) elapses between sowing and the appearance of the disease; (2) the flowers turn green as in some other virus diseases; (3) phloem necrosis occurs; (4) crystals and vacuolar corpuscles are found as inclusions in diseased leaves; (5) the leaves and leaf sheaths show a typical mosaic; and (6) gauze insulators prevent

transmission, pointing to insects as carriers of the disease.— Oran Raber.

17792. STANLEY, W. M., and M. A. LAUFFER. Disintegration of tobacco mosaic virus in urea solutions. Science 89(2311): 345-347. 1 fig. 1939.—This virus is rapidly disintegrated in 6 M urea and 0.1 M phosphate buffer at pH 7, with appearance of sulfhydryl groups, into low molecular weight protein components which contain no nucleic acid, exhibit no double refraction of flow, are insoluble in dilute buffers, and possess no virus activity. The rate of degradation varied widely with urea and electrolyte concs., type of electrolyte, pH, and temp. The results obtained may provide information on the nature of the forces which hold together the large virus molecule.—Courtesy Exp. Sta. Rec.

the large virus molecule.—Courtesy Exp. Sta. Rec. 17793. STOUT, G. L. Peach mosaic. California Dept. Agric. Bull. 28(3): 177-200. 10 fig. 1939.—The author reviews the discovery and early history of the disease, including early studies by Reed and Thornberry in California. Discussions follow, summarizing present data on the virus nature of the malady, descriptions of the blossom, foliage, fruit, and twig symptoms, the effects on fruit production, its transmission and spread (including extensive orchard records under the author's supervision), hosts, control methods, and a survey of current control operations in California. 15 references are included.—Courtesy Exp. Sta. Rec.

references are included.—Courtesy Exp. Sta. Rec. 17794. WALKER, J. C., and R. H. LARSON. Yellow dwarf of potato in Wisconsin. Jour. Agric. Res. 59(4): 259-280. 6 fig. 1939.—The symptoms of yellow dwarf in Wisconsin are discussed. One important phase of the symptomatology not previously reported is the nonemergence of plants from infected seed tubers. The study of temp. relations shows that the top symptoms develop most rapidly and severely at high air temps, and they may be suppressed at 16° C. Low soil temps, favor germination and emergence from infected seed tubers and tend to suppress the appearance of top symptoms. High soil temps, tend to prevent emergence and to hasten the appearance of top symptoms. The "poorstand" phase of yellow dwarf in the field is associated with high soil temps. in the period. The sporadic appearance of yellow dwarf in epidemic form is discussed. The greatest amount of dissemination in 1937 was in the eastern part of Portage County in central Wisconsin where the clover leaf hopper (Aceratagallia sanguinolenta) was most prevalent. No field evidence of spread by the potato leafhopper (Empoasca fabae) or by aphids was secured. A study of contiguous low-disease and high-disease areas in central Wisconsin during the period from 1932 to 1938 shows no correlation between red clover plantings and yellow dwarf epidemics. It appears that other sources of inoculum are more important in central Wisconsin. Russet Burbank tended to escape infection in the section in central Wisconsin where 18 other vars. or strains of potato became heavily in-

fected in the epidemic of 1937.—Auth. summ.
17795. WALLACE, J. M. Evidence of production of antibody-like substances in Turkish tobacco, Nicotiana tabacum, infected with curly-top virus. Phytopath. 29(9): 828. 1939.
—Abstract.

NON-PARASITIC DISEASES

17796. AJROLDI, PAOLO. Le alterazioni morfo-istologiche dei frutti di pero colpiti dalla grandine. [The morpho-histological alterations of pear fruits struck by hail.] Riv. Patol. Veg. 29(1/2): 85-98. 5 fig. 1939.—Examination of pears obtained in market which were injured by hail, showed, in case of slight surface injuries, peridermal neoformations and frequently the formation of numerous nodules of sclerenchymatous cells around and under the area struck. More serious injuries gave rise to suberization of the peridermal tissues as well as portions of the pulp of the fruit, with consequent loss of flavor. The most seriously injured fruits were invaded by fungi and bacteria.—F. M. Blodgett.

17797. ARKHANGELSKAYA, N. New methods of studying the brown spotting disease in potato. Compt. Rend. (Doklady) Acad. Sci. URSS 19(3): 211-214. 1938.—Agrochemical investigation of different soil samples has shown that soil acidity is not the crucial point; though the disease occurs only on acid soils, it does not increase parallel with the increase in soil acidity.—Ash of leaves of most seriously affected plants showed the lowest % of MgO. The sig-

nificance of these findings in relation to mineral nutrition is

discussed.—Oran Raber.

17798. DASTUR, R. H. Studies in the periodic partial failures of American cotton in the Punjab. I. Early breakdown of the photosynthetic apparatus. Indian Jour. Agric. Sci. 9(2): 285-290. 3 pl. 1939.—In a previous contribution an early breakdown of the photosynthetic system was described as an abnormal feature of 4F Punjab American cotton plants (G. hirsutum) that produced bolls with immature seeds and weak lint. The different stages of the disintegration of the chloroplasts in the leaves are now traced. The breakdown occurs in 2 ways arising from 2 different causes, mechanical and chemical. The mechanical rupture of the chloroplasts occurs through the daily growth of the starch grains that remain unhydrolyzed, due to some interference in the enzymic activity of the cell. The chloroplasts bulge and form a network with the starch grains in the meshes. Tannins appear later in such cells. The appearance of small pores or cavities marks the starting point of the chemical disintegration of the chloroplasts. They swell and fuse with one another forming a spongy mass with circular cavities. Tannins develop and cover the dissolving chloroplasts. The 2 types of disintegration were reproduced experimentally in normal leaves: mechanical bursting of the chloroplasts, by interrupting the transport of carbohydrates from the leaves by ringing the stem; chemical disintegration of the chloro-plasts, by the application of NaCl to the soil. The premature breakdown of the photosynthetic apparatus oc-curred in the leaves of plants that developed the external symptoms of the disease, such early breakdown of the chloroplasts was noticed in the leaves of normal plants. $R.\ H.\ Dastur.$

17799. DASTUR, R. H. Studies in the periodic partial failures of American cotton in the Punjab. II. Formation and accumulation of tannins in leaves. *Indian Jour. Agric. Sci.* 9(2): 291-303. 3 pl. 1939.—The cell deposits in the leaves and the roots of the American cotton plants (4F) mentioned in a previous contribution (1936) consist of tannins and their derivatives. Accumulation of tannins occurred in leaves of plants that later developed the external symptoms of the disease viz., the reddening and shedding of the leaves and defective opening of the bolls. Such accumulations did not occur at any stage in leaves of healthy and normal plants. The relationship between the accumulation of tanning in the leaves and the final opening of the bolls in the diseased plants was established by a systematic and detailed examination of the different leaves of 10 plants in 3 fields where the soils were termed good, medium and bad according to the condition of the cotton crop in previous years. The leaves of plants from the bad soil showed the largest accumulation of tannins from an early stage of growth, and the % of badly opened bolls in the plants averaged 85. The leaves from plants from the good soil showed no accumulation of tannins at any stage of growth and no bad opening of the bolls occurred in these plants. The leaves from plants from the medium soil showed slight accumulation of tannins with about 40% of bolls badly opened. The yields of plants from the 3 fields were in the same order. These differences in tannin accumulation are only comparative.-R. H. Dastur

17800. De PERALTA, F., and J. A. AGATI. The rice cadang-cadang in Albay Province. I. Its probable cause. Philippine Jour. Agric. 10(2): 153-171. 7 pl. 1939.—A disease of rice paddies called cadang-cadang was found to be due to nutrient deficiency in the soil. This deficiency, in which N

is the most important, renders the plants chlorotic and generally stunted in growth.—M. Manresa.

17801. FAWCETT, G. L. Una nueva enfermedad de las papas. [A new disease of potatoes.] Rev. Indust. y Agric. Tucuman 28(10/12): 223-225. 2 fig. 1938.—A new disease of potatoes, "chocolate," has appeared in Tucuman (1937). It is similar to the "internal brown spot" of Europe and N. America. However, it has not been studied sufficiently to determine its causative agent. A nontechnical description is given with precautions against its spread.—J. W. Gilmore.

17802. FAWCETT, H. S., and A. S. RHOADS. Lesions on Quercus laurifolia similar to those of leprosis on citrus in Florida. Phytopath. 29(10): 907-908. 1 fig. 1939.—Lesions

on the above oak closely resembling those of leprosis on citrus were found in a number of places in Florida in 1932 and in each case occurred in proximity to the latter disease on citrus. The possibility is suggested that the lesions on oak and citrus may be due to the same cause.—Authors.

17803. HILL, H. Mineral deficiencies in Quebec orchards. Ann. Rept. Pomol. and Fruit Growing Soc. Prov. Quebec 45: 40-44. 1938.—Attention is drawn to the occurrence of severe foliage symptoms due to K deficiency, occurring in a number of commercial orchards. These symptoms are described. In such orchards it is recommended that N applications be materially reduced and that K2SO4 be applied at the rate of 500 lbs. per acre. A description is given of a serious foliage disorder present in the apple orchards of the Frelighsburg area. It is stated that the symptoms resemble those produced by Mg deficient treatment in pot sand-culture expts. and the disorder is tentatively classified as due to a deficiency of Mg. The orchard soils in this district are classed as high in N, well supplied with total K, but low in Mg and Ca. Results are given of the analyses of affected and healthy leaves. The outstanding feature is the very low Mg content of all leaf samples affected with the symptoms described. In affected leaves the percentage of Mg in the ash varies from 1.19 to 2.50, whereas the percentage of Mg in the ash of normal leaves is reported as 5-6%. Pending further investigations it is recommended that 150-200 lbs. of MgSO, be applied per acre. Treatment for the control of cork disorders is given—H. Hill.

17804. KOEHLER. RENTAMEN

17804. KOEHLER, BENJAMIN. Crazy top of corn. Phytopath. 29(9): 817-820. 1 fig. 1939.—Crazy top of maize is a disease characterized by vegetative proliferations supplanting the floral organs. Only the upper part of the stem may be deformed, or the ear shoots and all parts above may be deranged. Its occurrence has been observed in Indiana, Illinois, and Iowa with prevalence of over 50% of the plants in spots of several acres. The cause is unknown.

B. Koehler

17805. TAUBENHAUS, J. J., and G. E. ALTSTATT. Some factors contributing to tomato puffing. Plant Physiol. 14 (3): 575-581. 1939.—Tomato puffing is a fruit defect causing losses of 8 to 15% of the tomato crop in Texas. The cause of this defect is still unknown. It is influenced by soil moisture and probably by certain fertilizers, as well as some environmental conditions. Irrigated plants produced a higher percentage of puffed fruits than did plants grown without irrigation.—G. E. Altstatt.

17806. ULLSTRUP, ARNOLD J. Preliminary observa-

tions on a kernel discoloration in inbred and hybrid lines of dent corn. Phytopath. 29(10): 905-907.1 fig. 1939.—Affected kernels ranged from a light tan to a medium brown. The discoloration was confined chiefly to the crown of the kernel, in some instances extending a short distance down the faces of the kernel. Viability of affected seeds was not impaired. Platings of kernels on different agars was not impared. Flatings of kernels on different agars adjusted to various pH levels, together with histological examination, failed to show any fungi or bacteria associated with the discoloration. The aleurone layer is lacking in discolored areas. The cause of discoloration is unknown.— A. J. Ullstrup.

17807. VALLEAU, W. D., STEPHEN DIACHUN, and E. M. JOHNSON. Injury to tobacco leaves by watersoaking. *Phytopath*. 29(10): 884-890. 3 fig. 1939.—Tobacco leaves, kept water-soaked for 24 or 48 hrs. (the time claimed to produce epidemic wildfire and blackfire, to be necessary to produce epidemic wildfire and blackfire, if inoculated with the respective organisms) are likely to show extensive injury either at the end of the period of water soaking or during the next few days, in the absence of infection. If the water-soaked tissues are inoculated the injury resulting bears no resemblance to blackfire field injury as it occurs on maturing dark tobacco. Water-soaking appears to play little if any part in blackfire (Bacterium tabacum) outbreaks as they occur on maturing dark

tobacco in Kentucky.—Authors.

17808. WALLACE, T. Magnesium-deficiency of fruit trees. Jour. Pomol. and Hort. Sci. 17(2): 150-166. 1939.—
Mg-deficient plants show leaf chlorosis, necrosis of interveinal tissue and premature fall of the older leaves. Chlorosis occurs near the tips and edges of the leaves, spreading inwards to the midrib. Mg-deficiency is associated with the following chemical features: decreased dry matter in the

fresh leaf, low total carbohydrate (starch) content, and high ash in dry matter. The incidence of Mg-deficiency is related to manurial practices other than Mg fertilizers. Apple trees at 3 centers in England have been studied. Composition of the leaves of terminal shoots can be used to determine the condition of the foliage with regard to lime, magnesia, and potash supplies. Acid soils that are deficient in Mg can be treated with magnesia limestone, Epsom salts, kieserite, and sulphate of potash-magnesia. Neutral soils or soils containing carbonate of lime but deficient in Mg can be treated with quick-acting Mg salts.—E. L. Overholser.

PARASITISM AND RESISTANCE

17809. BALDACCI, ELIO. Prime ricerche di immunizzazione di organi isolati e tessuti vegetali in vitro. I, II. [First studies on the immunization of isolated plant organs and tissues in vitro. I, II.] Boll. Soc. Ital. Biol. Sperim. 14(1): 50-52. 1939.—I. Excised leaves of Trifolium pratense cultivated in sucrose soln. (1 to 10%) and experimentally infected with Macrosporium commune could not be immunized either by extracts from diseased plants or by specific or non-specific filtrates.—II. Sterile cultures from root tips of maize cannot be immunized by employing as vaccine the filtrates of 2-months'-old cultures of Rhizoctonia solani var.

ambigua.—I. Coijmann.
17810. BEVER, WAYNE M. Reinoculation of resistant varieties of wheat with purified physiologic races of Tilletia. tritici and T. levis. *Phytopath*. 29(10): 863-871. 1939.—Six purified physiologic races of *T. tritici*, 3 of *T. levis*, and a species hybrid were used in an expt., over a 3-yr. period, to determine the percentage of infection obtained by repeated reinoculation of a resistant variety with its own smut. Cross inoculations were made to compare the effect of inoculating a resistant var. with smut from a susceptible var. as well as to determine the viability of the inoculum. Inoculum of each race was taken from (1) a susceptible var. and put on a susceptible var., (2) a susceptible var. and put on one or more resistant vars., (3) each resistant var. and put back on it, and (4) each resistant var. and put on a susceptible var. The % of smut infection varied from year to year, depending largely on environmental conditions; but when a purified physiologic race of bunt is used the amt. of infection resulting from the reinoculation of a resistant var. with its own smut is not significantly higher than when inoculated with the same race from a susceptible var.—W. M. Bever.

17811. BRINKERHOFF, LLOYD A. Pathogenicity and pathological histology of Phymatotrichum omnivorum in a woody perennial, the pecan. Phytopath. 29(9): 823. 1939.— Abstract.

17812. DUNDAS, B., and G. W. SCOTT. Physiologic strains of bean rust. Phytopath. 29(9): 820-821. 1939.— Two single-spore isolations of bean rust [Uromyces phaseoli], one from a Washington and one from a Florida collection, were compared with the 2 previously described strains of bean rust by inoculating plants in the field and in the greenhouse and on inoculated abscised leaflets floated bottom side up on a 5% sucrose soln. in petri dishes. The 3 methods of testing gave essentially identical results. These strains were found to be different from each other and from the 2 previously described strains.—B. Dundas.

17813. DUNDAS, B. Host range and strains of the powdery mildew (Erysiphe polygoni) of bean and cowpea. *Phytopath.* 29(9): 824. 1939.—Abstract.

17814. DUNDAS, B. Inheritance of resistance to powdery

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mildew in runner beans (Phaseolus coccineus), tepary beans (P. acutifolius), yard long beans (Vigna sesquipedalis) and cowpeas (Vigna sinensis). Phytopath. 29(9): 824. 1939.— Abstract.

17815. HARRIS, R. G., J. NAGHSKI, M. A. FARRELL, and J. J. REID. The relation of the soluble specific substance to virulence and specificity in bacterial leafspot organisms. Jour. Bact. 38(2): 235-236. 1939.—Abstract. 17816. JONES, FRED REUEL. Evidence of resistance

in sweetclover to a Phytophthora root rot. Phytopath. 29 (10): 909-911. 1939.—An early spring root rot of sweet clover caused by *P. megasperma* is reported from the Ohio Valley northward into Wisconsin. Resistant plants have been found chiefly in a strain of *Melilotus alba* and these plants when selfed have given populations with high percentages of resistant plants in artificial tests.—*F. R. Jones.*

17817. MACKIE, W. W. Breeding for resistance in blackeye cowpeas to cowpea wilt, charcoal ref., and root-knot nematode. Phytopath. 29(9): 826. 1939. Abstract. 17818. MURPHY, H. C. Effect of crown and stem rusts

on the relative cold resistance of varieties and selections of oats. Phytopath. 29(9): 763-782. 4 fig. 1939.—Infection with crown rust (Puccinia coronata avenae) or stem rust (P. graminis avenue), or shading, during the hardening period reduced the capacity for juvenile oat plants, grown under greenhouse conditions, to become hardened against injury from artificial freezing. The loss in cold resistance caused by rust infection became greater with an increase either in severity of infection or degree of exposure. Plants in the 4leaf stage were less resistant to cold, whether infected or rust-free, than those in the 6-leaf stage. Crown rust infections ranging from 20 to 80% lowered the cold resistance of 21 vars. 13 to 68%; stem rust infections of 15 to 85% lowered the resistance of the same vars. 9 to 91%. Possible shading resulting from extraneous rust spores appeared not shading resulting from extraneous rust spores appeared not to be an important factor in lowering cold resistance. The average hardiness indices of the vars and selections included in 43 freezing tests are presented.—H. C. Murphy.

17819. NAGHSKI, J., R. G. HARRIS, D. E. HALEY, and J. J. REID. Plant nutrition and disease resistance. Jour. Bact. 38(2): 234-235. 1939.—Abstract.

17820. RUSSELL, R. C. Pathogenicity tests with cultures of Ophiobolus graminis Sacc. Sci. Agric. [Ottawa] 19(11): 662-669. I fig. 1939.—The cultures used came from Saskatchewan and several other parts of the world. They had been in pure culture for from one-half a year to over 15 years. Apart from the influence of environmental conditions, the pathogenicity of each isolate appeared to fluctuate over long periods of time in pure culture, although the general tendency seemed to be for it to decrease with the passage of time. Attempts to alter the pathogenicity, by varying the environmental conditions under which the pure cultures were maintained, were not successful.—R. C. Russell.

17821. SANFORD, G. B. Research on certain soil-borne diseases as affected by other micro-organisms. Sci. Agric. 1382ses as affected by other inter-organisms. See Agree. [Ottawa] 19(10): 609-615. 1939.—Owing to important differences among Ophiobolus graminis, Helminthosporium sativum, Fusarium culmorum, Sclerotinia sp., Rhizoctonia solani, and Actinomyces scabies with regard to persistence in a natural or steam sterilized soil, and to their relative effectiveness in producing disease on hosts present, as influenced by associated bacteria and fungi, a particular and different technique may be necessary with each in order to establish satisfactory artificial infestation of soil and to simulate natural conditions of virulence and longevity of these soil-inhabiting plant pathogens. Examples are cited from the author's studies on the antibiotic effects of associated soil organisms. It is concluded that a reliable index of pathogenicity must be devised in each local problem as a basis for the study of the effects of types of soil, of microorganisms, of crop plants and of their debris on the pathogenic behavior of soil-inhabiting pathogens. The cooperation

of soil microbiologists is needed to evaluate these factors.
17822. SEMPIO, C. Influenza della luce e dell' oscurità
sui principali periodi del parassitamento. Studio condotto su alcune malattie fungine di piante coltivate. [Influence of light and darkness on the principal periods of parasitism. Studies conducted on some fungus diseases of cultivated plants.] Riv. Patol. Veg. 29(1/2): 1-69. 8 pl. 1939.—Continuing work previously reported [see B. A. 13(3): entry 5004], the effect of darkness is reported for each of the 3 periods of the following diseases: lettuce mildew (Bremia lactucae), white rust of radish (Cystopus candidus), powdery mildew of wheat (Erysiphe graminis), leaf rust of wheat (Puccinia triticina) and bean rust (Uromyces appendiculatus). In general, keeping plants in darkness during the first period (from the 1st to the 3d or 4th day after inoculation) notably increased, while keeping the plants in darkness during the 3d period (from the 7th to the 9th or 10th days after inoculation) decreased, the severity of attack. This depression of the disease due to treatment during the 3d period is less permanent with some diseases than with others, thus with lettuce mildew, powdery mildew of wheat and white rust of radishes the depression below the control diminishes with time but this capacity of renewal is lacking almost totally with leaf rust of wheat. When radish plants were held in dark ess until partially etiolated before inocula-tion with white itst, the disease was more severe than on the controls. After an extensive review of literature it is concluded that the depression of the disease when kept in darkness during the 3d period is due to the need of the fungus parasites for nutrient substances and especially carbohydrates at this period of sporulation.—F. M. Blodgett.

17823. STEVENS, N. E. Disease, damage, and pollination types in "grains." Science 89(2311): 339, 340. 1939.—The author examines the available evidence as to whether genetic uniformity will or will not favor the building up of specialized strains of parasites. In doing so he develops a "disease index" based on the volume of the literature and the economic value of the specific crop plants concerned. He concludes: "Any one who is unwilling to accept the significance of a correlation between the striking freedom from disease and the fact that the plant can reproduce only by crossing . . . should at least advance some other hypothesis."-Courtesy Exp. Sta. Rec.

17824. VASUDEVA, R. SAHAI, and MOHAMMAD RAFI-QUE. Studies on the root-rot disease of cotton in the Punjab. IV. Chemical composition of healthy and diseased cotton plants. Indian Jour. Agric. Sci. 9(2): 331-342. 1939.— Reducing sugars are higher in all parts, i.e., root, stem and leaf, of diseased than in corresponding parts of healthy plants. Total N, ammoniacal N, Fe and the ratio of Ca to K are significantly higher in diseased than in healthy roots. The ratios of Fe in leaf to Fe in root, and Ca in leaf to Ca in root, are lower in diseased plants, and the ratio of K in leaf to K in root is higher in diseased than in healthy plants.

17825. WALKER, J. C. Disease resistant pea verieties. Canner 88(12): 89. 1939.—Note on resistance, with special

reference to wilt and near-wilt.—Courtesy Exp. Sta. Rec. 17826. YOUNG, P. A. Tomato wilt resistance and its decrease by Heterodera marioni. Phytopath. 29(10): 871-879. 1939.—Extensive evidence showed that *H. marioni* greatly decreased the resistance of many vars. of tomato to wilt caused by *Fusarium lycopersici*. The following formula was used in calculating the time-weighted percentages of wilt resistance of 207 selections of tomatoes. growing in epiphytotics of tomato wilt: 100%—(2a+2b+15c+2d+e+f+05g=h, where a, c, e, and g are the percentages of plants with wilt symptoms nearly 100, 112, 125, and 145 days after seedling emergence, respectively; b, d, and f are the percentages of wilt-killed plants 112, 125, and 145 days after seedling emergence, respectively; and h is the time-weighted percentage of wilt resistance of the tomato selection. The percentages thus detd. described precisely the wilt resistance of the vars. under the conditions described. Much variation was found in the wilt resistance of separate selections of single tomato vars. Physiologic leaf roll and a hollow var. of tomato were described. The following vars. showed the strongest wilt resistance: Blair Forcing, Buckeye State, Illinois Baltimore, Louisiana Pink, Louisiana Red, Marglobe, Riverside, and Rutgers.—P. A. Young.

17827. ANONYMOUS, 1938 sweet corn wilt tests. New Jersey Agric. Exp. Sta. Plant Dis. Notes 16(8): 25-29. 1938.—Tests were conducted in 5 localities in New Jersey. At Moorestown, where wilt was severe enough to give reliable data on resistance among 13 vars. Whipcross P39, Whipcross C62, Golden Cross Bantam, Bancross P39, and Charlevoix C2 yielded best and the first 3 proved very resistant to wilt (Aplanobacter stewarti). Seneca Golden was extremely susceptible and yielded least. A summary of the performance of 45 vars. and strains planted at New or the performance of 45 vars, and strains planted at New Brunswick, as to wilt, smut, and yield showed that Early Bancross P39, Whipeross P39, and Golden Cross Bantam again ranked first. Among the very early types, Marcross 13-6, as in 1937, proved highly resistant.—Courtesy Exp. Sta. Rec.

DISEASE CONTROL

17828. BAIN, DOUGLAS C. Effect of sulphuric-acid treatment on fungi and bacteria present on cotton seed from diseased bolls. *Phytopath*. 29(10): 879-884. 1 fig. 1939.—Cotton seed from bolls infected with Bacterium malvacearum were treated for as long as 1 hr. in conc. H_2SO_4 , rinsed in sterile water, and transferred to Petri

dishes containing potato-dextrose agar. Fungi (Sordaria, Diplodia, Fusarium, Alternaria, and others), and B. malvacearum were recovered in culture from these seeds. With the longer treatments, fewer organisms were obtained in culture. Fewer organisms were recovered from heavy (gravity-separated) seeds, and heavy seeds gave the highest percentage of germination. There was no marked difference in the number of organisms recovered from seeds given an additional treatment in alcoholic HgCl2 soln.—D. C. Bain.

17829. BARRETT, J. T. Overwintering mycelium of Plasmopara viticola (B and C) Berl. and DeT. in the

California wild grape, Vitis californica Benth. Phytopath. 29(9): 822-823. 1939.—Abstract.

17830. CALDIS, P. D. Spraying by airplane for disease control in peach orchards. Phytopath. 29(9): 823. 1939.— Abstract.

17831. DIMOCK. A. W. The effects of sea spray deposits on spore germination and mycelial growth of the cypress canker fungus. Phytopath. 29(9): 823. 1939.— Coryneum cardinale on Cupressus spp. in California.

17832. FLINT, W. P., and H. W. ANDERSON. Directions

for spraying fruits in Illinois. Illinois Agric. Exp. Sta. Circ.

492. 1-32. 6 fig. 1939.

17833. HEWITT, J. LEE. Registration of citrus trees inspected for psorosis. Phytopath. 29(9): 825. 1939.

17834. HUBER, GLENN A., KARL E. BAUR, and EDWARD P. BREAKEY. The effect of calcium cyanamid on development of apothecia of Sclerotinia fructicola and

on development or apothecia of Scientifia fracticola and on population of Taeniothrips inconsequens in prune orchards. Phytopath. 29(9): 825. 1939.—Abstract.

17835. JENKINS, W. A. Controlling the peanut leaf spot. South. Seedsman 2(5): 4, 17, 19. 1 fig. 1939.—After summarizing previously noted points relating to the two Mycosphaerella leaf spots of peanut, the author adds data and on eartral Preliminary trials. on reductions in yield and on control. Preliminary trials (1937-38) of sulfur dust (325-mesh) were encouraging, and progress is noted on development of resistant strains of

peanuts.—Courtesy Exp. Sta. Rec.
17836. KELSALL, A. Orchard sprays with particular reference to efficiency and safety. Ann. Rept. Pomol. and Fruit Growing Soc. Prov. Quebec 44: 6-25. 1937.—Bordeaux mixture is the strongest fungicide with which we have had experience. The mixture produces harmful effects on fruit and foliage of such a character as to be rarely more than negligible. Arsenical insecticides are only fairly effective when combined with Bordeaux. Lime-sulphur, due to foliage injuries, and to drop of fruit, cannot be considered a satisfactory spray, at least in many locations. The iron sulphate and lime-sulphur mixture is about equally effective in the control of apple-scab as lime-sulphur, but when combined with insecticides it is not quite as effective against biting insects. It is, however, comparatively harmless to fruit and foliage, and may be used freely during wet weather. The wettable sulphurs are less effective against scab but are comparatively harmless to the tree, and when combined with arsenicals, are effective against biting insects. Flotation sulphur of the Ferrox type is a highly efficient fungicide, comparatively harmless to the tree and combined with arsenicals, constitutes an efficient insecticide.—H. Hill.

17837. LEUTRITZ, JOHN Jr. Acceleration of toximetric tests of wood preservatives by the use of soil as a medium. Phytopath. 29(10): 901-903. 1939.—Rapid decay was noticed in soil-covered wood during expts, with termite colonies. Studies under controlled conditions gave evidence that moisture control obtained by the use of soil was primarily responsible for the uniform and rapid decay of southern pine sapwood (*Pinus echinata*) when inoculated from pure cultures of common wood-destroying fungi. Further research may reveal the rôle of other factors, especially the effect of organic and inorganic nutrilites.—J. Leutritz, Jr.

17838. MILLER, P. W. The efficacy of some insoluble copper sprays for the control of walnut bacteriosis in Oregon. Phytopath. 29(9): 826. 1939.—Abstract.
17839. PETCH, C. E. Results of five years' experiments with some of the newer spray materials. Ann. Rept. Pomol. and Fruit Growing Soc. Prov. Quebec 44: 25-32. 1937.—Ca arsenate has given satisfactory control of biting insects, including codling moth, during the past 4 yrs. Bentonite sulphur applied during full bloom did not give

benefits as regards scab control and seemed to diminish the crop. Lime-sulphur 1-40 gave the best control of appleseab in almost every case. Addition of iron sulphate to lime sulphur and Ca arsenate appeared to interfere with the fungicide. Bentonite sulphur gave poorer scab control than lime sulphur with or without addition of iron sulphated. than lime sulphur with or without addition of iron sulphate. During the yrs. when scab is not epidemic it could be used in all sprays following the pink-bud stage. In yrs. when scab is epidemic it should not be used. Flotation sulphur (Ferrox type) appears to be not nearly as good as lime sulphur when apple scab is epidemic.—H. Hill.

17840. RIETSEMA, I. Oplossing van het mozaiekvraagstuk by de frambozen. [A solution of the mozaic problem in raspberries.] Landbouwk. Tijdschr. 51(620): 14-25. 1939. By inbreeding raspberry strains for 2 or 3 generations, practically seed-constant types have been produced. They were found to have been weakened by inbreeding, but were found to have been weakened by inbreeding, but crossing weakened strains usually resulted in heterosis, and strong growing plants of great productivity were obtained which were free from mosaic disease. By rapid vegetative reproduction the number of healthy plants may quickly be adapted to the demand. The appearance of degeneration in the inbred strains caused some difficulty, therefore only homozygous plants are selected for seed therefore only homozygous plants are selected for seed production.—I. Rietsema.

production.—1. Avecsema.

17841. STREETS, R. B. The effect of intercrops and forage crops on the incidence and severity of Phymatotrichum root rot on pecan. Phytopath. 29(9): 827. 1939.—

17842. STREETS, R. B., and LLOYD A. BRINKERHOFF. Further studies on the control of Phymatotrichum root rot in the pecan by soil treatments. *Phytopath.* 29(9): 827.

17843. THOMAS, HAROLD E., and LEWIS O. LAWYER. The use of carbon bisulphide in the control of Armillaria root rot. Phytopath. 29(9): 827-828. 1939.—Abstract.

17844. TRINCHIERI, GUILIO. Per un elenco internazionale di fitofarmachi di riconosciuta efficacia. [For an

nazionale di intolarmachi di riconosciuta efficacia. [For an international catalogue of phytopharmaceuticals of recognized efficacy.] Riv. Patol. Veg. 29(3/4): 185-189. 1939. 17845. WILSON, E. E. The effect of petroleum oil emulsion on the fungicidal value of Bordeaux mixture. Phytopath. 29(9): 828. 1939.—Abstract.

MISCELLANEOUS

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17846. EHRLICH, JOHN. An improved transfer hood. Phytopath. 29(10): 908-909. 1939.—The glass top slopes towards the operator; the rear is of glass; the sides are of wood with glass doors; and the front is of taut cloth with elbow-length sleeves elastic at the free ends. Rubber gaskets, glued to the bottom edges, make contact with an enameled table top which replaces a fixed bottom. Burner-heated air escapes through glass wool in a passage near the top of each side gable. A trough along the bottom of each front pane catches water condensed during steaming. Electric showcase bulbs are fixed at the base of the top.— Electric showcase bulbs are fixed at the base of the top.

17847. MONTEMARTINI, LUIGI. Note di Fitopatologia, (11-13). [Phytopathological notes 11-13.] Riv. Patol. Veg. 29(3/4): 161-167. 1939.—In Viburnum tinus in the open at Palermo regularly each year the old leaves assume a leaden or silvery appearance at the time the buds are opening. It appears first as spots on the upper surface and soon spreads covering the whole area of the leaf. This also occurs on V. odoratissimum and V. lucidum but not

on V. rhytidophyllum and V. sargenti. This appearance is due to an alteration of the external nembrane of the epidermal cells and the disappearance of chlorophyll in the adjacent palisade layer. The old leaves of Durante Ellisa also take on a dark leaden metallic color. Notes are presented on the relation of the weather to the cracking of also take on a dark leaden metallic color. Notes are presented on the relation of the weather to the cracking of fruits of the pomegranate (Punica granatum). The cracking are said to occur most commonly on the more mature sides of the fruits, which are exposed to the sun, and to sides of the fruits, which are exposed to the sun, and to extend transversely across the fruits. A case is recorded where the lichen, Usnea barbata, occurs in a humid narrow valley on larch but not on fir, though the two grow crowded

valley on larch but not on fir, though the two grow crowded together. This is in contrast with previous reports of the together. This is in contrast with previous reports of the opposite which seems to raise the question whether the lichen is a parasite, perhaps a weak or wound parasite, with the phenomena of specialization.—F. M. Blodgett. 17848. ROSE, DEAN H., C. O. BRATLEY, and W. T. PENTZER. Market diseases of fruits and vegetables: Grapes and other small fruits. U. S. Dept. Agric. Misc. Publ. 340. 1-27. 10 pl. 1939.—This publication is the 6th in a series designed to aid in the recognition and identification of pathological conditions of economic importance affecting of pathological conditions of economic importance affecting of pathological conditions of economic importance anecung fruits and vegetables in the channels of marketing, to facilitate the market inspection of these food products, and to prevent losses from such conditions. The commoditions and to prevent losses from such conditions. The commodities covered are grapes and other small fruits, including cranberries, and the treatment of the material is similar to that employed in the earlier publications in the series.

cranderries, and the treatment of the material is similar to that employed in the earlier publications in the series. The 10 colored plates illustrate the more important diseases discussed in the text.—D. H. Rose.

17849. WEAN, ROBERT E., and J. E. YOUNG. Renewed liquid-cultures of fungi. Phytopath. 29(10): 895-898. 1939.—Liquid cultures of Pythium debaryanum were renewed during a 10-day period by means of a flow-meter apparatus. Richard's soln, was used at full conc., 1/2 conc., 1/8, and 1/32. The solns, were renewed at the rate of 400 cc. per 24 hrs. At full conc. growth was suppressed; at 1/2, 1/8 and 1/32, it was increased. The pH was maintained at the original 4.7 in the renewed solns,; a drift to 6.72 occurred at 1/32 conc. in the controls.—R. E. Wean.

17850. WENZL, HANS. Die Untersuchung epiphytischer Methode). Zentralbl. Bakt. II. Abt., 100(14/17): 327-342. 1939.—The author discusses fully the technique of the

methode). Lemman. Bakt. 11. Apr. 190(14/11): 021-342. 1939.—The author discusses fully the technique of the transparent film method for the examination of epiphytic fungi, its practical application, advantages and limitations. The method consists essentially in the application of collodion or related substance to the surface of the material investigated and the subsequent removal of the film or membrane which may be examined, directly or following embedding. In addition to collodion, other cellulose derivatives, soluble in organic solvents, were studied (methyl-, ethyl-, oxyethyl propyl-, and acetyl-cellulose), as well as gelatin and gum arabic, and a water-soluble cellulose glycol ether. The method is particularly advantageous for studying ether. The method is particularly advantageous for studying epiphytic fungi where the development is not detectable macroscopically.—A. G. Lochhead.

17851. YOLORES, BERNARDO R. Extent of defects of some dinterocarn species in northern, central and south-

17851. YOLORES, BERNARDO R. Extent of defects of some dipterocarp species in northern, central and south-eastern Luzon. Philippine Jour. Forest. 2(2): 185-199. 1939.

This paper presents the results of a survey of timber defects caused by fungi in dipterocarp logs at several localities. The demand is greater in regions without a without a localities. The damage is greater in regions without a pronounced dry season. Extent of decay varies with spp. on the same site. The cull % ranged from 5 to 31.—W. N.